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THE PROGNOSTIC VALUE OF THE STUDY OF THE BLOOD CHEMISTRY IN THE ACUTE ABDOMEN

PRELIMINARY REPORT*

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THE rapid advances made in simplifying the technique of blood chemistry have opened new fields for investigation in many pathological conditions. For a time effort was centered chiefly on the study of the various forms of nephritis. More recently Tileston and Comfort in 1914¹ reported their observations made upon the non-protein nitrogen and the urea content of the blood in 142 cases of various pathological conditions; amongst these, there was one case each of strangulated hernia, acute intestinal obstruction, and paralytic ileus. The explanation offered for the increased non-protein nitrogen found in the blood in these cases was (a) that owing to stagnation of the intestinal contents there was a marked increase in the decomposition of nitrogenous elements in the intestinal canal, as evidenced by the increased amount of indican found in the urine, (b) that the increased absorption of poisonous substances from the intestines affected the renal function, and led to defective elimination, and (c) that the great loss of body fluids by vomiting led to a greater concentration of the non-protein nitrogen.

Prompted by these observations, Cooke, Rodenbaugh and Whipple² made an extensive study of the non-coagulable (non-protein) nitrogen of the blood in experimentally produced intestinal obstruction in animals. These authors demonstrated that the intoxication observed in intestinal obstruction was in a great part due to a

proteose, which was comparatively easily isolated from the closed loop of intestine in animals by means of either 95 per cent. alcohol or ammonium sulphate, and was very toxic—100 milligrams causing the death of a dog weighing fifteen pounds.

This same proteose is apparently also present in the exudate from peritonitis in man, since the latter has the same toxic character as those found in the animal's closed loop. It has therefore been suggested by these authors that this proteose is the factor in the production of the toxic effects observed in human intestinal obstruction. Peritonitis and pancreatitis have some clinical features in common, and these cases were also studied. This proteose is not necessarily due to bacterial activity, since it can be found in the peritoneal exudate produced by injection of sterile turpentine, and in that pancreatitis produced by the injection of sterile bile. Associated with this increase in non-protein nitrogen in the blood, there was found, also, an increase in the urinary excretion of nitrogen of from two to three grams per day above the normal, and also, where the increased non-protein nitrogen was found in the blood, there was a good kidney function. The increased blood nitrogen found in the presence of a good kidney function, and a greater urinary excretion of nitrogen than would be expected from a local reaction, suggested to these authors that this was not due to defective elimination but to increased tissue destruction, and a high non-protein nitrogen in the blood should be a guide in the prognosis of the cases.

*From the Department of Metabolism of the Montreal General Hospital.

That urea is toxic in itself has long been doubted since large amounts have been introduced into animals without producing toxic (uræmic) effects. This idea has lately been questioned³. Since the body has about five litres of blood it should only require the injection of about 10 gms. of urea to increase the concentration of the blood urea to 200 mgms. per 100 c.c. This does not occur. If, however, urea is given in sufficiently large quantities over the proper periods to maintain this level of 200 mgms. per 100 c.c. these observers have noted that toxic (uræmic) manifestations do occur.

Following upon these observations, a routine study of the blood chemistry was made in a number of cases admitted to the Montreal General Hospital having or suspected of having acute intestinal obstruction, acute peritonitis or acute pancreatitis. Examinations were made as completely as possible, but subject to the general condition of the patient, and it will therefore be noted that the data are rather fragmentary. The analyses made were of the non-protein nitrogen, urea nitrogen, creatinine, sugar, chlorides and cholesterol. The kidney function was judged by the excretion of phenolsulphonephthalein, and McLean Index of excretion (relation between the concentration of urea in the blood and the rate of its excretion). For the purpose of this communication, only the blood nitrogen and phenolsulphonephthalein excretion will be recorded.

The "day of disease" in each case refers to the onset of acute symptoms, disregarding the older history of ulcer, malignancy, etc. Where only one finding is recorded, the tests were not repeated, since the clinical picture did not warrant it.

The normal figures are accepted as follows:

Urea nitrogen 12-15 milligrams per 100 c.c.
Phenolsulphonephthalein 60-80 per cent. in two hours.

No. 2041, male, age eighteen, admitted May 4th with a history of three days' illness. Clinical diagnosis, ruptured appendix, general peritonitis. Blood urea nitrogen on admission and before operation 108 mgms. per 100 c.c. Operation on the night of admission. May 6th, general condition slightly improved, with enemata slightly effectual, wound draining well. Blood urea nitrogen 112 mgms. per 100 c.c. (increased four mgms.)

May 12th. Complains of abdominal pain. No change in general condition, enemata fairly effectual. Blood urea nitrogen 120 mgms.

per 100 c.c. (increasing). Phenolsulphonephthalein 66 per cent. in two hours.

May 16th. Abdominal pain severe, marked distention, enemata ineffectual. Blood urea nitrogen 146 mgms. per 100 c.c. Died 2.00 p.m. It will be noted that the blood was showing a gradual increase in nitrogen while the clinical picture was not definitely changed. Also the kidney function was normal.

No. 3333, male, age sixty-eight, admitted July 22nd with history of four days' illness, with cramp-like pains in the abdomen, vomiting, and constipation. Clinical diagnosis, incomplete obstruction, inoperable carcinoma of the large bowel. Blood urea nitrogen 126 mgms. per 100 c.c. The patient made a rapid downward course and died July 31st.

No. 2224, male, age twenty, admitted May 15th with history of seven days' illness. Clinical diagnosis, perforated duodenal ulcer, general peritonitis, ileus. Blood urea nitrogen before operation 110 mgms. per 100 c.c. At operation upon the same day, an ulcer was found in the superior portion of the second part of the duodenum, with perforation and a general peritonitis. The perforation was closed and a gastroenterostomy was performed.

May 17th. Slight relief of distention, enemata slightly effectual. Blood urea nitrogen 90 mgms. per 100 c.c. Phenolsulphonephthalein 64 per cent. in two hours.

May 19th. Marked distention, enemata ineffectual. Blood urea nitrogen 120 mgms. per 100 c.c. Died.

No. 3548, male, age forty, admitted August 15th, with history of two days' illness. Clinical diagnosis, perforated appendix, general peritonitis. Blood urea before operation 160 mgms. per 100 c.c. At operation the pelvis was found filled with faeces. Phenolsulphonephthalein 60 per cent. in two hours. Died.

No. 1975, male, age forty-three, admitted April 30th, with history of five days' illness. Clinical diagnosis, perforated appendix, general peritonitis. Blood urea nitrogen before operation 84 mgms. per 100 c.c. Operation the same night.

May 1st. Distention relieved, enemata effectual. Blood urea nitrogen 80 mgms. per 100 c.c.

May 2nd. Distention marked, enemata ineffectual. Blood urea nitrogen 80 mgms. per 100 c.c. Phenolphthalein 48 per cent. in two hours. Died.

No. 2226, male, age seventy-four, admitted May 16th with old history of constipation, and

history of acute obstruction. The patient was in a moribund state. Blood urea nitrogen 84 mgms. per 100 c.c. Operation on the night of admission showed blood in the peritoneal cavity, collapse of the sigmoid, and thickening of bowel at the site of obstruction, with puckering of the mesentery. Colostomy, obstruction relieved.

May 17th. Blood urea nitrogen 84 mgms. per 100 c.c. Phenolsulphonephthalein 71 per cent. in two hours. Died. Pathological report: Sarcoma of bowel. Intestinal obstruction.

No. 3474, male, age sixty-two, admitted July 31st, with old history of hernia and history of acute obstruction. Blood urea nitrogen on admission 80 mgms. per 100 c.c. At operation the strangulated bowel after relief of the obstruction was oedematous, and only slightly viable. Operation, colostomy, bowel emptied, colostomy wound closed, lateral anastomosis.

August 1st. Some improvement in general condition, enemata slightly effectual. Blood urea nitrogen 77 mgms. per 100 c.c. Phenolphthalein 66 per cent. in two hours.

August 4th. Marked distention. Blood urea nitrogen 77 mgms. per 100 c.c. Died.

No. 1986, female, age twenty-two. Diagnosis, chronic valvular disease of heart, pregnancy.

May 1st. Therapeutic abortion. Intra-abdominal sterilization.

May 2nd. Suspected post operative obstruction. Pain in abdomen, distention, enemata effectual. Blood urea nitrogen 39 mgms. per 100 c.c.

May 3rd. Enemata effectual, blood urea nitrogen 30 mgms. per 100 c.c.

May 4th. Definite evidence of obstruction, enemata ineffectual. Blood urea nitrogen 51 mgms. per 100 c.c. At operation a coil of mesentery was found adherent to the cornu of the uterus. Adhesions removed.

May 8th. Blood urea nitrogen 26 mgms. per 100 c.c.

May 9th. Blood urea nitrogen 16 mgms. per 100 c.c. Discharged well.

No. 2284, male, age seventy-six, admitted May 20th with history of two days' illness. Diagnosis, acute diverticulitis, pericolicitis, acute obstruction. Enemata ineffectual. Blood urea nitrogen 142 mgms. per 100 c.c.

May 25th. Enemata effectual, distention absent. General condition improved. Blood urea nitrogen 35 mgms. per 100 c.c. This patient made an uneventful recovery, and subsequently underwent a two stage prostatectomy. Recovered.

No. 2150, male, age forty-nine, admitted May 11th. Diagnosis, perforated appendix, general peritonitis, ileus. Blood urea nitrogen before operation 20 mgms. per 100 c.c. This case in no definite way appeared different, clinically, from case No. 1975, except for the low blood urea. Discharged well.

No. 5075, male, age twenty-seven, admitted November 9th with history of one day's acute illness. Clinical diagnosis, perforated appendix, general peritonitis, adynamic ileus. Blood urea nitrogen before operation 22 mgms. per 100 c.c. The general picture of this case did not differ from that of No. 3548 except for the low blood nitrogen. Discharged well.

No. 4896, male, age thirty-seven, admitted October 27th. Clinical diagnosis, volvulus, acute obstruction. Blood urea nitrogen before operation 20 mgm. per 100 c.c. Discharged well.

No. 5561, female, age thirty-six, admitted December 20th with old history of gall stones and history of acute illness for thirty-six hours. Diagnosis, acute pancreatitis. At operation wide fat necrosis was found. Before operation blood urea nitrogen 54 mgms. per 100 c.c. Operation, drainage of gall bladder.

December 21st. Blood urea nitrogen 21 mgms. per 100 c.c.

December 22nd. Blood urea nitrogen 21 mgms. per 100 c.c. Note the fall in the urea after operation. This is the type of case in which a very unfavourable prognosis is given. Discharged well.

No. 5172, female, age thirty-five, admitted November 16th with a history of eleven days' illness. Clinical diagnosis, acute pancreatitis. At operation fat necrosis was found. Blood urea nitrogen before operation 54 mgms. per 100 c.c.

November 17th. Blood urea nitrogen 21 mgms. per 100 c.c.

November 30th. Cessation of bile drainage, mucous fistula. Blood urea nitrogen 20 mgms. per 100 c.c.

December 13th. Blood urea nitrogen 16 mgms. per 100 c.c.

December 23rd. Recurrence of symptoms of the original attack—vomiting, shock, tenderness in the epigastrium, and to the left, general abdominal rigidity. Blood pressure, systolic 105. Leucocyte count, 24,800. Blood urea nitrogen 26 mgm. per 100 c.c. During the night the bile broke through and drained copiously, clinical symptoms promptly relieved.

December 24th. Blood urea nitrogen 16 mgm.

per 100 c.c. (10 mgm. drop in twelve hours). Discharged well.

No. 5006, female, age eleven, admitted November 4th with history of three days' illness. Diagnosis perforated appendix, general peritonitis. Blood urea nitrogen before operation 40 mgms. per 100 c.c.

November 5th. Blood urea nitrogen 22 mgms. per 100 c.c. Discharged well.

No. 5456, male, age twelve, admitted December 7th with history of three days' illness. Clinical diagnosis, perforated appendix, general peritonitis. The patient looked profoundly ill, and in no way differed clinically from No. 2041. Blood urea before operation 21 mgm. per 100 c.c.

December 8th. Blood urea nitrogen 21 mgms. per 100 c.c. Convalescing.

TABLE ON CASES ACCORDING TO DEGREE OF CONCENTRATION OF BLOOD UREA

HOSP. NO.	BLOOD UREA NITROGEN mgm. per 100 c.c.	PHENOLSULPHO- NEPHTHALEIN per cent. in 2 hours	RESULT
2041	146	66	Died
3333	126	12	"
2224	120	64	"
3548	104	60	"
1975	110	48	"
2226	80	71	"
3474	77	66	"
1986	51 on admission	..	Well
	16	..	
2284	142 on admission	..	"
	35	..	"
2150	20	..	"
5075	22	..	"
4896	20	..	"
5561	60	..	"
5172	54	..	"
5006	14	..	"
5456	18	..	"

The diagnosis in all the fatal cases was corroborated by the autopsy findings.

The object of recording the cases in order of their degree of concentration of blood urea will be seen from a glance at the table. The striking

thing noted is that all the deaths are grouped together at the top of the table. That the kidney function was normal as judged from the excretion of phenolsulphonaphthalein suggests that this increase in blood nitrogen is not due as first suggested (1), to defective kidney elimination, but to increased tissue destruction. No. 3333 did show a low dye excretion but also had an advanced chronic nephritis.

CONCLUSIONS

From such a small number of cases studied it would be unwise to formulate definite conclusions. The following points are, however, suggestive:

1. In intestinal obstruction, whether mechanical or adynamic, in acute general peritonitis, and in acute pancreatitis, the blood urea nitrogen rises above the normal in spite of normal kidney function.

2. This rise in the blood urea is therefore due to increased tissue destruction and not to defective kidney elimination.

3. The tissue destruction is probably due to the toxic effect of a proteose absorbed.

4. The maintenance of a high blood urea nitrogen, in the presence of a good kidney function, is indicative of an unfavourable prognosis, in spite of the amelioration of the clinical symptoms.

This work was made possible through the co-operation of the visiting staff of the Montreal General Hospital.

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TOXÆMIAS OF PREGNANCY—EARLY RECOGNITION AND TREATMENT

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PROVISION for human health has been made by certain lines of fortification against disease both from within and from without. In the former case we shall divide these into three lines, namely: (1) The alimentary mucosæ. (2) The liver, and (3) the glands of internal secretions, or antitoxic glands, which are the supra renal capsules, the pituitary body, the thyroid glands, and in the foetus the thymus gland, which was probably intended to destroy the enterotoxines traversing the placenta and derived from the mother's blood.

The intestinal mucosæ acts both mechanically and chemically and the leucocytes exercise their usual function on the soluble and figured elements of the intestinal tract and guard against the toxic elements entering the capillaries. The intestinal mucosæ absorb the hexone bases and amino acids thus transforming them into living and useful albumin by a vertible organic synthesis and thus rob the bacteria of their prey. Hence the intestinal mucosæ exercise, with regard to microbic poisons and outside of its passive rôle of filtrating membrane, a truly antitoxic and protecting function. The function of the liver cells is to withdraw from the portal vein the toxic substances which have escaped the mucosæ, or first line of defence, so as to prepare and deliver to the blood circulating throughout the organism substances which are slightly toxic to be eliminated more easily and without danger to the economy. Urea is formed in the liver at the expense of the amino acids and ammonia, the latter of which is very toxic. Uric acid is mostly formed in the liver at the expense of other toxic agents.

The glands of internal secretion should arrest the toxins passed by the mucosæ and liver.

A defect in the equilibrium or metabolism in the prenatal state may easily weaken any of these lines of defence. The condition of pregnancy requires that the system continue in

its well balanced and fortified state. Fortunately in the majority of these cases gestation follows a perfectly physiological and untoward course. "At the same time," Williams says, "in no other condition is the border line between health and disease so less sharply drawn, since a very slight irregularity often suffices to convert a physiological and normal into a pathological and abnormal state. The general metabolism becomes profoundly modified during gestation, as shown by the fact that during the latter months of pregnancy, a pregnant woman stores up nitrogen and water to a far greater extent than at other times. Moreover it is probable that the excretory functions are more liable to serious derangement, since they are called upon to care for the waste products of the foetal as well as the maternal organism. For this reason many women who are perfectly well at other times may suffer from the retention of certain metabolic products. Following the statement of Bouchard that all pregnant women suffer to a greater or less extent from auto-intoxication, certain French observers, notably Pinard and St. Blaise, advanced the supposition that all the abnormal manifestations of pregnancy rest upon such basis and that mild conditions, such as slight headache, salivation and certain skin eruptions on the one hand, to such serious diseases as eclampsia on the other, represent respectively the early and later stages of the one and same process, which they designate as hepato-toxæmia. Veit, of Germany, advanced similar views but held that all of the disturbances of pregnancy, from slight abnormalities of pigmentation to eclampsia, result from a cystolic process following the entrance of chorionic tissue and foetal ectoderm into the maternal circulation. These views are being largely dispelled by later studies of toxæmias.

A static condition of the colon is found in all conditions of toxæmia, but this may be the result of autotoxæmia as well as a cause. Fatty acids may accumulate in the blood through any of the points of absorption and thus produce

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an acidosis or diminution of the alkalinity of the blood. The greater part of carbonic acid in the blood is chemically bound so that the ability of the blood to absorb carbonic acid depends upon the alkiline reaction. The kidneys have for their mission the elimination of all excess of acid and that is why they are able to extract from the blood a liquid that is acid—the urine. But if the proportion of acids entering the blood is excessive the kidneys no longer suffice for the task of removing it. Hence this diminution of the alkalinity of the blood will lead to a toxæmia caused by the retention of the carbonic acid, the tissues being no longer able to rid themselves of it through the blood. This acidosis only occurs when the fatty acids are formed in excess in the system and it rarely happens except under faulty metabolism in breaking up and fermentation of the fats is particular. These poisons augment the condition of the pregnant women. This is likely due to the greater toxicity of the oxidized products, to the decreased internal secretion, diminished permeability of the kidneys and the fact that pigmentation of the skin is less favourable to elimination.

In consequence, the liver, subcharged with fat and glycogen, becomes insufficient. Splenic anæmia, by conveying blood pigment in exaggerated quantities to the liver, may render it insufficient from excess of work. The degree of anæmia in these cases is increased in proportion to the intensity of the toxæmia. Hæmoglobin may be diminished from 80 per 100 to even 50 per 100, and red blood cells running as low as 3,000,000, irregular in size, form and colour, while the white blood cells are increased.

The excess of entertoxines, by fatiguing the hepatic cells and irritating the blood vessels, gradually brings about insufficiency and produces a vicious circle, which may be noticed in the dyspepsia of this delicate state.

Septic absorption from the teeth, or pyorrhœa alvolaris may produce a septic condition in the kidneys and blood. It has been demonstrated that pus has been found in the kidneys in these cases similar to that found in cases of general septicæmia.

The pregnant condition is very susceptible to external conditions, as cold weather and environment. Cold seems to affect the equilibrium between the centres and the periphery of the body, paralyzing nerve centres and thus inhibiting the elimination by skin and kidneys and bowel. This loss of equilibrium caused by

cold may produce an unstable condition of metabolism, producing an acidosis and a faulty elimination and resulting in stasis. Maternal oxygenation is decreased, lung expansion and heart action is disturbed, blood pressure raised. A depressing environment may also be a factor by nervous depression and the resulting inhibitory action. A cheerful environment should be the patient's.

This toxæmia may be recognized by copper blotches in face and body, red lips, pale face, dark streaks under eyes, oedematous appearance, headache and malaise in the milder form to pernicious vomiting, yellow atrophy of liver, nephritic toxæmia or eclamptic toxæmia and even eclampsia in the more advanced stages. Blood pressure is a very important factor in diagnosis, as this may give a clue to the trouble several weeks before albuminuria is found.

The treatment is either prophylactic or curative. As prophylactic measures all foci of infection or septic absorption, such as defects of teeth, pyorrhœa alveolaris, tonsils, intestines, and kidneys should be discovered and eradicated. Bland, non-irritating diet recommended; no alcoholic or strong beverages or candy to be taken; seven or eight glasses of water taken daily; regular daily movements of bowels required; proper clothing to be worn, baths to be taken every other day and all worry removed.

Curative treatment will depend upon the condition of the case. Basham's mixture or Liq. Ferrit Amm. Citrate is a good form of iron to be given for the anæmia. Diurætics containing 10 grain doses of soda bicarbonate every four hours. Lemonade and magnesium sulphate and a milk diet may be given. In cases of threatened eclampsia the patient is put to bed, hot packs applied every eight hours, copious doses of magnesium sulphate given and put upon a strictly milk diet. If in thirty-six hours the hypertension does not subside and the albuminuria decrease it will be necessary to terminate pregnancy. In primiphora with hard cervix, much hypertension and a high percentage of albuminuria it might be well to resort to Cæsarian section, as in induced labour the toxæmia is accentuated, blood pressure raised and the patient weakened. Chloroform should be given sparingly if at all in these cases on account of its toxic and depressing effect but ether given instead.

Should eclampsia occur, large doses of magnesium should be given. Colon irrigation employed and hot pack applied. The stomach

should be well washed out in one hour with 5 per cent. solution of soda bicarbonate and a Murphy drip of 5 per cent. solution soda bicarbonate and 6 per cent. solution of glucose employed. Veratrum vireli may be tried for steadying the heart action. Morphine sulphate $\frac{1}{2}$ grain with atropine sulphate 1-100 grain or ether given to control spasms.

In conclusion, we might say that the termination of gestation, which is our last resort, will probably be our sheet anchor until prophylaxis by education and instruction so elevates the mass of the people that these states of toxæmia during pregnancy will be rare instead of relatively common.

THE EPIDEMIOLOGY AND DIAGNOSIS OF ENCEPHALITIS LETHARGICA

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MUCH confusion has arisen through our misconception of the terms Epidemiology and Epidemiological relationship, the endeavour of the epidemiologists to prove to us that the epidemics of encephalitis, of poliomyelitis, cerebro-spinal meningitis and influenza, have frequently occurred in close relationship in the world's history, has led to quite unlooked for conclusions.

The epidemiology of encephalitis is inextricably bound up with that of polio-myelitis and with that of cerebro-spinal meningitis and of all in turn has it been said that they preceded, accompanied or followed some more or less generalized febrile epidemic, influenza-like in its symptoms and character. An undoubted epidemiological relationship does exist, however, and in four hundred years of records of medical history there are to be found many interesting accounts of epidemic paralyses, stupors, and vague nervous disorders, occurring in more or less close connection with generalized waves of infections which are considered to have been influenza; in many instances the epidemic nervous disorders preceded the outbreak of the more widespread, grippe-like fevers; paragraphs from Hippocrates would well describe the epidemiologic relationship of encephalitis and influenza in England in 1918 and is no less applicable to the state of affairs in Canada in the winter of 1919-1920.¹

Encephalitis as a specific disease and not merely as a complication of some acute infection

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has been identified, to the satisfaction of the epidemiologists at least, for several hundred years,* one fairly conclusive detail is always of material assistance in the identification—epidemic paralyses are rare at best,—the meningitides, poliomyelitis encephalitis, and the food poisonings practically comprise the whole class, the epidemiology of these three is strangely similar and seems as regards all of them to be closely bound up with that of the more or less well recognized sweats and catarrhal fevers of the middle ages. Perspective and elapsed time have had much to do with the development of the idea that encephalitis depends in any way upon some preceding infection.

Realizing these points it seems better to come quietly down through the ages, to admit the many interesting associations of the many obscure affections of the nervous system with each other and with other epidemic disorders, but to reserve one's critical analysis for the age of more accurate observation; to one epidemiologist for example, deductions in such a well-known disorder as influenza, are to be considered unreliable if drawn from description made prior to the great epidemic of 1889-90,² much the same can be said of encephalitis lethargica; the conditions de-

* According to Hecker, "Hauptkrankheit," "The head disease," a pernicious fever with inflammation of the brain, was well recognized in Germany and referred to long before the sixteenth century. He regularly refers to it as encephalitis. He considers an epidemic in France in 1482 as encephalitis but the description would fit any acute infection.

scribed may have been and have been cerebro-spinal meningitis, poliomyelitis, food poisonings, or simply the severe nervous type of many different fevers. The references made to "epidemic paraplegias occurring in a winter season and preceding a burning fever of the spring,"¹ may be taken as an example of early epidemiological association, an association, one part of which the "epidemic paraplegias" seems likely to have been encephalitis, poliomyelitis or meningitis, and through the centuries one finds many such records of the occurrence of what may have been this supposedly new disease "Nona" of the last few years.³ As already mentioned, the fact which most impressed itself upon the early writers was that these disorders seemed to recur in such close relationship to the sweats and catarrhal fevers, the commonest epidemic disorders of the dark and middle ages, and some of which undoubtedly were the ever returning waves of influenza in its many forms. Needless to say but few reliable details exist from these centuries.

It is not till the 15th century that we can make much use of described conditions: 1481-2, 1528-9, were again years of suggestive association of paralytic diseases, diseases the main features of which were "somnolence and inevitable stupor,"⁴ with the constantly recurring sweats; of more than passing interest is the attempt in the 16th century to show that the cause of some of these epidemic paralyses was some food intoxicant, fish or rye (ergotism), and from this time on we have the state of affairs as in 1918—epidemic paralysis, ergotism (raphania), (mal mazzucco), as a diagnosis, like the botulism of to-day, and with the influenza preceding or following.

Epidemic stupor 1545-6 and the head pain in Germany in 1543-46 are put forward by some writers as encephalitic manifestations, these conditions may have been almost anything, they seem at least to have existed apart from other epidemics; to call a disorder of 1567 an "avant-coureur" of the great influenza of 1580, is a kindness to history, it does service, however, in showing again that even if, "during the winter and at the beginning of spring there was a "quantity innumerable of paralyses" that at least they seemed to have an independent existence.⁵

1595 saw the "Kriellekrankheit" co-existing in Germany with epidemic catarrh, this disorder, like the mal mazzucco of the Italians, was usually ascribed to food intoxication, and the history of botulism, ergotism, raphania (the radish

disease), begins at this time; without doubt much confusion existed, the paralyses occurring epidemically must have puzzled the observers of the day, and one recollects that in 1918, botulism was the diagnosis made in England for the first cases of encephalitis, to be followed by the actual occurrence of botulism in the United States.

Nearly half a century later, 1657, the cycles of the various diseases we have been above referring to cut into each other again; influenza of 1657-8 "affected man most grievously in their brains and nervous stocks" according to Willis, and epidemic lethargies existed at Copenhagen; four years later, Willis's fever "infestuous to the brain and nervous stock" is described. Willis is said to have identified this fever with the German Kriellekrankheit, no very close association with preceding or following catarrhs is noted with this rather definitely labelled disorder.*

Two hundred years of epidemiological relationships between sweats, influenza, and the several erratically described disorders of the nervous system, bring one to a point where the confusion caused by epidemiological deductions becomes very evident; Heine's description of infantile paralysis appeared in 1834-5, epidemiological associations of infantile paralysis with catarrhal fevers and influenza is recognized at once, associations which like those of encephalitis lethargica allowed the nervous disorder to either precede or follow the more general epidemic, with as much reason as is used in discussing the aetiology of encephalitis, could one ascribe infantile paralysis to the virus of influenza.

At this period of medical history, symptoms of specific fevers due to involvement of the nervous system, and such conditions as ergotism, botulism, cerebro-spinal meningitis, encephalitis, poliomyelitis were but indifferently differentiated, the epidemiology of all the latter conditions is hopelessly obscure; approaching our own times some clearer epidemiological light is shed, it is a delight to read, as above mentioned, in one author's detailed account of the occurrence of influenza "that for practical purposes the epidemiologist must not begin his study earlier than 1889-90,"⁶ it is quite apparent from the history of all epidemics that in many instances cerebral

* The description by both Sydenham and Willis is of a disease much resembling typhoid, both give post mortem details, however, and the absence of intestinal lesions is commented upon by Creighton. There is no distinct resemblance to the present day encephalitis.

complications have been magnified into new diseases as seen in some influenzas, typhoids, pneumonias, it is also just as apparent that cerebro-spinal meningitis and poliomyelitis have frequently been confused with encephalitis: ergotism in the earlier years, and in the later years, botulism, have added materially to the difficulty of determining a clear history of the epidemiology of encephalitis.

By the end of the 19th century clinical medicine in its progress was beginning to show its influence on public health problems, poliomyelitis, well identified, seems to displace encephalitis in its frequent associations with the ever returning invasions of influenza, though the existence of the whole group of epidemic paralyzes, raphania, ergotism, botulism, meningitis, is still evident in many quarters, this was the condition in 1844-5; the year 1847 can be taken as one in which we could not have spoken of encephalitis as connected in any way with an influenzal infection for the great epidemic of that year, a catarrhal type, was followed by no outbreak of diseases of the nervous system, a few years later the cause of the present day confusion is well demonstrated, influenzas of 1850-51, 55-57 were of the nervous type and in 50-51, botulism, encephalitis "spinal and bulbar forms of typhoid" which may have been poliomyelitis were described as prevalent in Europe.⁷

During the next thirty years repeated appearances of all the acute disorders of the nervous system are noted, more or less intimate association with influenza is still to be seen, but an association again in which they all claim equal intimacy, and Crookshank tells us that in the years so often referred to as being years demonstrating the identity of encephalitis lethargica and influenzal infection, (1889-90), poliomyelitis preceded the influenza in Sweden, meningitis as a "new disease" went hand-in-hand with it about the Mediterranean and "Nona" or encephalitis followed it in Lombardy and Hungary;⁸ the history of the ages repeated, but with some slight shifting of the places occupied by the three diseases, infectious disorders whose epidemiology is strangely similar.

A few years later, 1895, one finds the suggestion made that polio-encephalitis co-existing with a local epidemic of gripe at Toulouse is merely an intense form of "gripe nerveuse" but in the far north east of Europe poliomyelitis was epidemic at Stockholm co-existing and following a minor outbreak of influenza while

VanErmengen at the same time by his discovery of the bacillus botulinus showed clear that an occasional epidemiological relationship is no proof of ætiological identity. From this time on it has seemed possible to determine what for many centuries must have confused many clinicians, namely, that the epidemic paralyzes so often referred to, so often associated with other epidemics were of four distinct types, poliomyelitis, cerebro-spinal meningitis, the food poisonings, (botulism, raphania, mal mazucco, krielbelkrankheit,) and the condition we are to-day discussing, encephalitis lethargica. The last few years have shown the history of disease repeated in concentrated form, the possibilities of epidemic extensions have been manifold; with the gathering of our armies, influenza and pneumonia began in England in October. December, 1914, a year later but almost unnoticed came marked rises in the incidences of the excess death rates in the respiratory diseases in the United States; these sharp rises usually staged between December and May are to the epidemiologists but indications of influenza recrudescences;⁹ for these minor waves of catarrhal fever, the associated condition, as far as disorders of the nervous system were concerned, was cerebro-spinal meningitis; complications involving brain and cord were uncommon with the influenza and the organism of meningitis was easily identified, epidemiological relationship expresses best the state of affairs: 1917 saw the beginning recognition of encephalitis, independently in Australia (whose troops, however, were returning from the Mediterranean basin), coincidently in Austria with respiratory diseases near what may be called the home of the disease, Lombardy and Hungary (Flexner): spreading through France and England and before the epidemic influenzas of 1918, encephalitis was either an after-comer of the unrecognized influenzas disguised as "respiratory diseases", or a fore-runner of the great triple-waved epidemic. It was existing as botulism in England before the convalescents of the first wave of influenza were returning from French hospitals, and was appearing in Canada and America before the ghastly plague of the autumn of 1918 (Thistle); a full year later, extending and appearing like poliomyelitis it preceded the influenza epidemic of 1920, lasted through it and has persisted rather in lessening than in increasing degree. Epidemiology is not ætiology, the purpose of these remarks is only to show that recently, as in the centuries gone by, diseases which may have

been encephalitis lethargica have existed and of necessity must have frequently coincided in their appearance with the ever recurring epidemic catarrhs and fevers. Should the view held by many, "that encephalitis is but a manifestation of influenza" be correct, then the virus of the latter disease has probably been discovered by investigators working successfully in the ætiology of encephalitis lethargica. No such claim has been put forward by them, and one can safely say that epidemiology not ætiology is the real bond of relationship between influenza and encephalitis lethargica.

Diagnosis. With the course of time and in the light of clear observation the diagnosis of encephalitis lethargica has become steadily more comprehensive and yet less difficult. Bearing in mind the pathology of the disease "hæmorrhages gross or microscopic in any part of the nervous system and attended with the specific alteration of the blood vessels, plus at times the signs of acute congestion and inflammation of the brain" one realizes that of necessity a multiform symptomatology must exist as regards the nervous system at least. A symptomatology which though largely of the motor centres or tracts has shown many signs referable to the sensory and psychic areas. The history of the onset of the disorder, either acute, with signs of an active general infection, fever, delirium, or at least with a well-defined initial stage, serve at once to distinguish it from the chronic degenerations of the nervous system, it is to be noted that already the suggestion has been made that encephalitis lethargica is the primary factor in some cases of insular sclerosis. This history of onset is all important, the encephalitis, local or diffuse, associated with sepsis, endocarditis, syphilis, cerebro-spinal meningitis, tuberculous meningitis, brain tumour or abscess may produce a picture indistinguishable from the specific encephalitis. The cerebral form of polio-myelitis, the encephalitis following mumps, scarlet fever, influenza differ from encephalitis lethargica only in the history of a defined preceding infection, and in the case of polio-myelitis in the ready detection of the ætiological agent.

Next in importance to the history of onset, stands the course of the disease in the deducing a diagnosis of the encephalitis in question. Convulsions, spasms, rigidity of neck, sensory disturbances, paralyses or pareses of the cranial nerves, perhaps associated with somnolence or lethargy and with a history of more or less sudden

febrile onset usually suggests the cerebral manifestations of acute infections, or

- (1) Cerebritis or abscess
- (2) Tuberculous meningitis
- (3) Cerebral syphilis
- (4) Cerebro-spinal meningitis
- (5) Botulism
- (6) An encephalitis
- (7) A neuritis (infectious)
- (8) Tumour
- (9) Pachymeningitis
- (10) Hæmorrhage
- (11) Uræmia
- (12) Comas

and the course of all these conditions may be very similar up to a certain point, for since the hæmorrhages of encephalitis may occur anywhere in the nervous system or its membranes, it is quite evident that any symptoms may be looked for, improvement in the general condition and recovery from the several severe signs of involved nervous tissue without specific treatment must always suggest encephalitis lethargica: the associated conditions of botulism are different, in many instances the encephalitic manifestation is largely neuritic, (c. f. the radicular form as described by the writers of to-day) recovery from the tuberculous meningitis and cerebritis is rare to a degree, some recovering cases of cerebro-spinal meningitis with clear spinal exudate may leave one in doubt, though in these cases the increased polymorphonuclear cell count in the exudate may help. The progressive course of untreated abscess and tumour and the more marked optic nerve changes of these conditions should be borne in mind, a pronounced condition of choke disc is rare, atrophy is almost unheard of in encephalitis, the history of onset is all important. Uræmic conditions and the various comas have usually diagnostic features of their own.

On a careful consideration of these two above mentioned points, the history of the onset and the course of the disease may depend and usually does depend the diagnosis of encephalitis, a certain sketchy classification into types has been attempted, we no longer consider simple cases showing fever, ocular pareses and lethargy as typifying the disease. Any epidemic will show

- (a) Acute fulminating cases, with fever, delirium, convulsions, or apoplectic symptoms, suggestive of a general infection with diffuse cerebritis or hæmorrhage, few or no localizing signs may be present.

- (b) Severe or mildly infected cases showing pareses or affection of cranial nerves with or without lethargy: during an epidemic many cases of mild, suddenly developing, ocular and facial paralyses are noted to occur.
- (c) Cases with distinct bulbar symptoms.
- (d) Cases showing symptoms suggestive of involvement of the basal ganglia (optic thalami, caudate nucleus) lethargy, paralysis-agitans like symptoms, athetoid and choreiform movement, localized spasmodic movements: in these cases it is suggested that small hæmorrhages are interfering with the controls of the cortical centres, the acute imitation of paralysis agitans, chorea minor and chorea insaniens has been a feature of many epidemics.
- (e) Cases showing acutely developing hemiplegic, monoplegic, paraplegic symptoms, more usually spastic,—as if affecting the upper neuron, these are distinctly less common.
- (f) Cases with cerebellar symptoms.
- (g) Cases with marked psychical symptoms.
- (h) Cases with marked meningeal symptoms, with clear or hæmorrhagic exudates, pachymeningitis.
- (i) Cases with symptoms suggestive of sensory tract involvement.
- (j) Cases showing symptoms of polyneuritis and posterior root involvement with pain, the radicular type.
- (k) Poliomyelitic like cases.

As seen, the diagnosis in any of these forms must depend in many instances upon history and course. The fact that an epidemic exists; the more or less sudden onset with symptoms of an infectious disorder; the tendency in many cases to complete recovery from a disease with distinct signs of a multiform involvement of the nervous system are all important points; "diagnosis can never depend upon the presence or absence of any sign, symptoms or group of signs or symptoms."¹⁰

Certain clinical details and process of examination may help. The tendency to complete recovery has been mentioned: This may be delayed year long. The multiform involvement, a tendency towards relapses, the persistence of lethargy with continued well being, slight fever, are important in the summing up. A point strongly insisted upon as suspicious of infection by the encephalitis virus is the occurrence of

signs of cerebral hæmorrhages in younger persons not syphilitic and showing no gross signs of arterial degeneration.

Cloudy spinal exudates and those showing increased polymorphonuclear cell count with bacteria usually belong to other conditions. The findings in encephalitis lethargica more regularly show a slight increase in mononuclear elements in a clear fluid, hæmorrhagic exudates may occur and hæmorrhagic pachymeningitis appears in a new light, one hardly needs to touch upon the necessity of a Wassermann test or of a careful search for the presence of tubercle bacilli in the spinal exudate and signs of tuberculous disease elsewhere.

The absence of leucocytosis may be of use when debating the question of abscess or meningitis, the results of animal inoculation may help distinguish encephalitis from poliomyelitis and possibly we may shortly see that encephalitis itself may be diagnosed by this means, the washings of the nose and throat, the ground up mucous membranes being said to produce specific changes in certain animals.

Finally it may be said that the diagnosis can often only be made post mortem by the study of the affected tissues, this is particularly true of the gross hæmorrhagic form and no case of hæmorrhage in the nervous system in a young adult should escape histological examination of the brain vessels.

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HECKER.—New Sydenham Society Reports 1846, gives many of the details quoted to-day as evidence of the existence of encephalitis contemporaneously with epidemics of other general infections in the middle ages and later, his interesting chronological tables give many references to its existence, the epidemilological relationship to the Sweats is the most apparent feature fact.

BLOOD TRANSFUSION

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IN any surgical measure efficiency should not be sacrificed to simplicity of technique, but where two or more methods equally efficient are available the final choice will be in favour of the least complex. The technique of blood transfusion is essentially simple. Indeed, if it were not for the fact that blood is a coagulable fluid it would be scarcely more complex than an injection of salvarsan, but chiefly on account of this awkward characteristic of the transfused fluid, and to the seemingly multitudinous methods of overcoming it, medical literature appears to overflow with varieties and sub-varieties of ways of transfusing blood. Opinions as to the best method are still in a state of flux; the final choice has still to be made.

However, in selecting a method adapted to general practice a candid survey of the field will soon convince one that many if not most of the methods are not adapted to general work and are destined finally to serve as little else beyond a monument to the ingenuity and skill of their brilliant originators. Consider the position of a physician in civil practice in the country. In selecting a method of blood transfusion there are certain limitations incidental to his own facilities or lack of facilities and to the class of case that he may be called upon to serve which definitely circumscribe his choice.

1. He cannot depend on much skilled assistance. The brilliant team work applied in military practice is not for him. It must be largely a one man job.

2. He must not depend on pieces of special apparatus that are fragile and difficult to replace, or on special mechanical appliances which are difficult to sterilize or which have to be in frequent use to be kept in shape.

3. He will note that cases of acute hæmorrhage such as are common in military practice are uncommon in his own practice. Most of his cases will be more or less chronic anæmias such as pernicious anæmia, cachexia following cancer or chronic sepsis, or anæmia following prolonged metrorrhagia. These will require multiple trans-

fusions, often from the same donor. Hence any method that involves the destruction of the superficial vessels of either recipient or donor will be unjustifiable, or at least undesirable. If for no other reasons than those enumerated, a number of methods are at once excluded, namely, the older methods of arterio-venous anastomosis; the numerous brilliant methods involving the use of various paraffined containers, and the many ingenious devices consisting of special syringe with check-valves, 2 and 3-way taps, etc., and the choice is confined to a method involving the use of needles instead of canulæ and some simple method of delaying or inhibiting coagulation. These are essentially two in number. First, there is the method of transfusing unaltered blood by a series of small syringes described and used by the late E. Lindeman, and the second is the citrate method with which the name of Lewisohn is associated. The former is excellent, and is doubtless destined to be widely used, but has the disadvantage that a special form of needle is required as the ordinary needle cannot be held in place while the syringes are being changed and manipulated, and secondly, several assistants familiar with the method are required. His choice would therefore seem to be limited to some form of the Lewisohn method. That this in its original form is open to objection is seen by the appearance of several attempts to modify it. It will be remembered that the blood from the donor is allowed to flow from a large needle into an open vessel containing citrate solution and is stirred constantly with a glass rod. The objection appears to be the exposure of the blood to the air, and several methods are described in which it is drawn into closed containers. One of the most ingenious of these is that described by Far and Gilroy (*Surg. Gyn. and Obstet.*, March, 1919). This avoids exposure of the blood but in practice not infrequently results in failure from the formation of clots in the collecting tube. This objection is overcome in the Robertson method described by J. E. McCartney (*Edin. Med. Jour.*, September, 1919).

But this again is open to objections incidental to any method using a large flask and many tubes, *i.e.*, it is fragile, not easily cleaned, and difficult to sterilize and transport.

In a series of thirty-five transfusions during the past ten months, the writer has used with success an extremely simple form of technique of which most of the essential features are suggested by A. Zingher (*Med. Res.*, July 13th, 1918). The apparatus consists of the following articles:

(1). Two ordinary Yale or Paris needles, length one and one-half inch, gauge seventeen, carefully sharpened and with the lumen paraffined. One is attached to about five inches rubber tubing, and the other to about eighteen inches rubber tubing in which at about one and one-half inches from the distal (or needle) end is a short length of glass tube as in an apparatus for administering salvarsan. These are placed in wide test-tubes and sterilized immediately before use. (2). Five, four ounce bottles such as are used in ordinary dispensing, preferably those that are graduated in ounces and cubic centimetres. These are filled to the 20 c.c. mark with citrate solution freshly made up with water distilled immediately before and containing sodium citrate 1.8 per cent. and sodium chloride 0.85 per cent. These are loosely fitted with corks covered with gauze which is held in place with rubber bands and sterilized. (3). One, six ounce bottle containing 0.3 per cent. sodium citrate in saline prepared as above. (4). One bottle whose size may be anything from six to sixteen ounces, in the neck of which is inserted a small funnel containing a small piece of gauze. The funnel and bottle neck are covered with gauze and the whole sterilized. (5). One graduated funnel such as is used in administering salvarsan with both ends capped with gauze and sterilized. (6). A tourniquet consisting of a short length of rubber tubing. Hypodermic syringe with a few drops of 2 per cent. cocaine or other local anæsthetic. Sterile gauze and alcohol.

Compatibility tests are made as follows:

From the recipient blood is drawn from the arm vein into a Keidel tube as in taking a specimen for Wassermann test and set aside in a warm place to clot and the serum to separate. From each of the prospective donors blood is drawn from the ear-lobe as in doing a blood count. One or two drops are received into about 2 c.c. 0.3 per cent. citrate solution and centrifuged. The clear citrate solution is poured off and replaced by normal saline and again centrifuged,

the clear saline poured off, and the remaining emulsion of washed corpuscles used for the test. At each end of a microscope slide is placed a drop of the emulsion of donor's corpuscles. With one is mixed a drop of the recipient's serum and a cover-slip is applied to each. The one is the test, the other is the control. The preparation is examined immediately under the low power objective. Where bloods are compatible no change takes place in the even distribution of the corpuscles except for a little rouleaux formation, even after observation extending over one-half hour; but when incompatible, agglutination commences at once and can be hastened by gently agitating the corpuscles by pressure on the cover-slip. It is to be noted that the corpuscles of the donor are tested against the serum of the recipient and not in reverse order.

A suitable donor having been selected, the transfusion proceeds as follows:

The donor may report at the office where the blood is taken to be injected at the hospital or patient's home later in the day. But if there be no reason to the contrary it is usual for the donor to report at the hospital shortly before the time set for the transfusion. It is not at all necessary, however, that donor and recipient should be in the operating room together. The arm of the donor is exposed, and the tourniquet applied temporarily to determine which is the most accessible vein. The skin is then cleansed with alcohol and a few drops of 2 per cent. cocaine or other local anæsthetic injected intradermally at the site of puncture. (There is a distinct advantage in the use of the anæsthetic as the needle is large and with no anæsthetic produces enough pain to cause most patients to flinch. This interferes materially with the successful placing of the needle in the lumen of the vein.) The tourniquet is re-applied with just sufficient pressure to compress the veins without interfering with the radial pulse. From the needle attached to the short length of tube the stylet is gently removed so as not to disturb the inner coating of paraffin, and the needle inserted into the vein through the anæsthetized area. The blood is received into one of the four ounce bottles and the others in succession until they are all filled. As each is filled it is recorked and shaken. The donor is now dismissed. As four ounces is equivalent to 120 c.c., each bottle when full contains in addition to the 20 c.c. of diluent, 100 c.c. blood. The total volume of diluted blood is 600 c.c., and contains 1.8 gramme

sodium citrate. If the blood is to be stored or transported it is left in the small bottles until required. Otherwise the gauze covering the funnel in the large bottle is removed and the blood passed through the small gauze filter, thus removing any clots which may occasionally occur. Meanwhile the arm of the recipient is prepared in the same way as that of the donor. The long length of tubing is attached to the salvarsan funnel and the stylet removed from the needle. The tube and lower end of the funnel are filled with 0.3 per cent. sterile citrate solution, and when the solution is running freely from the needle its butt is grasped by the finger and thumb which at the same time pinch the rubber tube immediately behind so as to check the flow. The funnel is now lowered below the level of the recipient's arm and the needle inserted into the vein. At the same time pressure on the tube behind the needle is released, and as soon as blood is seen to flow into the short length of glass tubing the funnel is raised to the full length of the tube and is filled with the filtered citrated blood. The time taken to administer 600 c.c. of diluted blood is usually from twenty to thirty minutes. The needle puncture is sealed with collodion and the patient warned of the possible occurrence of a slight rigor but reassured that no harmful results will follow.

Using this technique the writer has to report thirty-five transfusions in amounts varying from 200 to 600 c.c., with an average of 415 c.c. The greater number were done in the dressing room of the hospital, five in the patient's home. There were no mishaps, and practically no difficulty other than would be attached to an injection of salvarsan by the older method. The only assistant was the nurse who happened to be on duty at the time.

The chief causes of failure in any method of blood transfusion are associated with the unavoidable tendency of blood to coagulate. This may take place at three sites:

1. In the needle while extracting blood from the donor.
2. "En bloc" after the blood has been drawn.
3. In the form of clots or flakes of fibrin in the citrated blood which may float into the needle during injection and occlude it.

With the technique described the first is avoided by paraffining the interior of the needle. This is easily done by inserting a small plug of solid paraffin into the butt which is heated in the gas flame. The wax is run into the lumen

of the shaft by means of the heated stylet which is finally left in place while the needle cools and is not disturbed until immediately before use. With this technique a much smaller needle can be used (seventeen gauge instead of fifteen gauge recommended by Zingher). The second is avoided by the use of small containers which insure a rapid and intimate admixture of the anti-coagulant with the blood, and by the use of a somewhat larger quantity of citrate which gives a concentration of 0.3 per cent. in the final dilution instead of 0.2 per cent. as recommended by Lewisohn. The last difficulty is adequately met by filtering the diluted blood through sterile gauze immediately before use.

A serious objection to the citrate method of blood transfusion is the not infrequent occurrence of reactions. This may consist of a rise of temperature sometimes as high as three degrees, with occasionally a rigour and vomiting. These occur in spite of meticulous care in the preparation of solutions. All observers note them. W. C. Hunt (*Texas State Jour. Med.*, September, 1918) reports 20 per cent. in 693 transfusions; A. L. Garbut (*Jour. Am. Med. Assoc.*, January 4th, 1919) 48 per cent. in 100 transfusions; R. Lewisohn (*Am. Jour. Med. Sci.*, February, 1919) 40 per cent. in 200 cases, and Drinker and Brittingham (*Archive Int. Med.*, February, 1919) report eighty-three transfusions at the Peter Bent Brigham Hospital that 60 per cent. gave temperature rise of 2.5 degrees, and 47 per cent. had chills. In the series here reported there was some reaction in 46 per cent., temperature rise of two degrees in 27 per cent. and chills in 34 per cent.

Stokes claims that the reaction is due to some substance absorbed from the rubber tubing and is to be avoided by soaking this in normal sodium hydrate solution. This was tried in the last two transfusions with no reaction. As to the results not much can be said as the series is so small. The immediate results were in every case good. There was improvement in appetite and general feeling of well being. The end results would appear to differ in no respects from those found by other workers.

Two were cases of prolonged uterine hæmorrhage. In both the results were good. One came to the hospital almost exanguinated, breathless, sleepless, restless, and perspiring, with red cells less than 1,500,000. Of the various donors volunteering, the husband and three eldest sons proved incompatible. The youngest son proved

suitable and was used at weekly intervals for five injections 200 to 450 at a time, with no apparent ill effects on his part and steady improvement on the part of the mother. Operation was then thought safe and a sub-total hysterectomy was done with the removal of a fibroid. The patient was discharged cured.

Two were cases of inoperable carcinoma of the stomach with marked cachexia. Each was given at weekly intervals five transfusions of approximately 500 c.c. each. In both the blood count improved to nearly a normal figure, and there was temporary improvement in general well being, but both finally succumbed to the advancing disease.

One was a case of pernicious anæmia in the practice of a confrère. There was no marked improvement in the blood count, and reactions were more marked and frequent than in other cases. Five transfusions were given. His general health improved, and for a time he returned to work. He died eight months later.

One was a case of puerperal sepsis seen in consultation. There was extreme anæmia, red

cell count 1,400,000, white cell count 33,000, with streptococci readily obtained in blood culture. Four transfusions of 450 c.c. each were given at three and four day intervals, with anti-streptococcus serum intravenously. There was improvement in appetite and the blood count improved to red cells 2,250,000, white cells 4,400, but the temperature continued steadily to rise, and she finally developed symptoms of thrombi in extremities and brain and died in coma with a temperature of 107 degrees.

One is a case of pernicious anæmia who is still under treatment.

Others were cases of simple anæmia who did well.

SUMMARY

[A simplified method of blood transfusion by the citrate method which avoids some of the objections to the original Lewisohn technique is described and experience with thirty-five transfusions detailed. The conclusion of Stokes as to cause of reaction after transfusion appears to be confirmed.]

On Selection of Medical Reading.—From the weary phrase of Ecclesiastes, "Of making many books there is no end," to Bacon's sage counsel that "reading maketh a full man," authorities have varied as to how much and what the student, the business man, the physician or the ordinary citizen should read. Quiller-Couch argues that it is starkly impossible to keep pace with all of the books that are being written. "About what is impossible," he says, "one does not argue. We must select. Selection implies skilful practice; skilful practice is only another term for Art." The fundamental basis of this art is a knowledge of the factors to be utilized in determining whether or not to buy a certain book. First, who is the author? What is his character, and scientific standing? What are the sources of his scientific and clinical data? Is he well known as an authority on the subject he discusses? Does he enjoy a reputation for painstaking methods? A knowledge of the personality and qualifications of the author is

especially necessary properly to evaluate a scientific book. Second, as to the book itself: Is it merely a compilation prepared by an assistant and stamped with the author's name, or is it a reflection of the author's own work, his personality and opinion? Third, Are the data obtained from recognized hospitals, clinics and research institutions or from the author's private experience? Is the evidence acceptable evidence? Fourth, What of the style? Does the author write carelessly? Are his sentences grammatical? Is the arrangement logical? Is his discussion diffuse, or has he concentrated the material to a minimum? Finally, it has been well said that the style of writing is an echo of the man's own soul. A blatant, didactic style is the mark of the egoist; a simple, reserved style, the sign of a conservative thinker; a careless, rambling style, evidence of a slipshod worker. And these comments will apply to manuscripts as well as to books.—*Editorial, Journal American Medical Association.*

NOTES ON FOOTWEAR

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ONE hesitates to say anything about feet or footwear, because it is such an old subject and everything that could be said has been said many, many times. Another reason for hesitancy is that anything on this subject might tend to deepen the misapprehension which is, apparently, ineradicably fixed in the mind of the general practitioner, viz., that the word orthopædics is derived from the Latin root for our word "foot," rather than from the Greek root for "child". (Just recently a patient was referred by a medical man for orthopædic treatment, and he was suffering from sweaty feet!) However, there is a large proportion of orthopædics in feet. For example, in one of the army orthopædic hospitals, something like eleven per cent. of the cases in 1917 and 1918 were painful feet: metatarsalgias and clawfoot.

Under metatarsalgias we should group bunions and acquired hammer-toe, for they have a common ætiological factor: a boot that is too short. There are other contributory causes, for we frequently find clawfoot in infantile paralysis and in injuries involving the internal popliteal nerve in any part of its course. At the same time the faulty boot is, even in these cases, often a contributory cause of the difficulty. We are provided with muscles which will preserve the transverse arch and maintain the foot in its natural shape, just as we are provided with muscles in the leg which will retain the longitudinal arch. When we put boots on, we splint the feet and throw the intrinsic muscles, to a certain extent at least, out of function. There is a resultant atrophy of these muscles, and a falling of the transverse arch. Not only do we get deformity from the atrophy of disuse, but the sole of the boot is usually of the rocker type which exaggerates the malposition. When we get the typical picture of toes curled up, extensor tendons contracted and very prominent, with what practically amounts to dislocation of the proximal phalanges on the metatarsal bones, the main factor in bringing this about is the shortness of the boot. It is obvious that this is

the fault, for the deformity of the foot is of the sort which shows the cramped position resulting from the member being pushed into too small a space. Short socks or stockings are also, perhaps, at fault, but the rôle they play is relatively a minor one.

In the ordinary walks of life, man can punish his feet in this way with apparent impunity, but when for any reason he has to carry excessive weight, the disability becomes evident. In civil practice the majority of metatarsalgias, uncomplicated by nerve lesions, come to us in middle life. However, the incidence of this condition due to the weight of equipment carried by soldiers in the late war emphasizes the fact that this crippling is begun relatively early. And when patients come to us seeking relief from the pain of a Morton's disease, metatarsalgia, clawfoot or bunion, we find this one fundamental fault, with variations: the enforced shortening of the foot.

Nature has made a wonderful instrument for carrying weight, with pads to protect the bones and joints. In the feet under discussion the pads which should protect the phalangeo-metatarsal joints are thinned because of the effort of the foot to accommodate itself to the restricted space. The proximal phalanges are hyper-extended and, because of that, the heads of the metatarsals are forced downward, displacing the protective pad. Then the pads below the ends of the toes are thrown out of position by the hyperflexion and immobility of the inter-phalangeal joints. The weight frequently falls on the end and nail of the toe, in place of on the bottom, or on the side of the toe, particularly in the case of the fifth. Compensating attempts to offset this are found in the form of callosities and corns at the points of greatest stress.

That bunion is a variation of the same condition is readily demonstrated. The toe cannot take its proper position, in alignment with the metatarsal bone with which it belongs and, in the attempt to accommodate itself to the confined space, the foot spreads at the widest

and weakest part of the ready-made shoe. This results in a lateral luxation of the phalangeo-metatarsal joints, the first being most frequently affected because it is under the greatest stress. Clawfoot may exist without bunion but, when bunion is present, this fundamental fault of cramped foot is present also. While bunion is usually found at the first phalangeo-metatarsal joint, the same pathology may obtain at the fifth phalangeo-metatarsal, or at the metatarso-cuboid joint. It is also found at the metatarso-cuneiform articulation, and here it is usually an upward displacement.

Hammer-toe generally occurs in the second digit. When we remember that the second toe is the longest, we can easily see the part the short boot plays in this deformity. Of course there are cases where the deformity may be congenital, (certainly many patients say they have had it since birth, and that it existed in the previous generation), but when the condition is present in adults, the boot is commonly too short and other stigmata of cramped foot are evident. I do not recall having seen it in an infant.

Considering the pathological anatomy, we find that there is, in addition to the atrophy of the muscles above noted, a distinct thinning of the plantar fascia and fat over the heads of the metatarsals. There is a contracture of the extensor muscles and tendons so that the latter stand out like bow-strings and, concomitant with that, a contracture of the dorsal-capsular ligaments of the phalangeo-metatarsal joints. In the sole, the curling of the toes results similarly in a contracture of the flexor tendons and the plantar part of the capsular ligaments of the inter-phalangeal joints. There is also a relaxation of the transverse metatarsal ligaments. Contracture of the plantar fascia follows. This pathology is common to troubles in the anterior part of the foot. If there is a bunion there is, in addition, the bursitis, and, depending on the severity of the condition, more or less of an exostosis at the particular joint involved. Arthritis may be present by extension from the bursitis.

Pain which patients suffer from this disability varies considerably. In Morton's disease, it is considered due to the pinching of the nerve between the head of the fifth and the shaft of the fourth metatarsal bone. This causes a fire-like stab of pain on lifting the foot. More likely there is a steady ache in the ball of the foot. Not infrequently the patient complains of dis-

comfort in the front of the leg, and that he is easily tired walking. Examination shows that he is walking on his heels and has the extensors in the anterior part of the leg on a continuous strain to take the weight off the front part of the foot. This automatic attempt to relieve the distress often leads to aching in the muscles of the back because of faulty balance in maintaining the upright position. Frequently the patient complains of pain in the feet and legs and of weakness and inability to walk comfortably; but whether it be any of these, or the burning of a bunion, it is very important to include the feet in making an examination of any patient. Every doctor should provide himself with a foot measure, should know what a shoe size is, and should be able to determine whether or not his patient is wearing the proper size.

In obtaining relief from this condition, the first thing one thinks of is to have shoes made which will allow for correction of the deformity. When orthopaedic shoes are mentioned, one immediately thinks of the large, wide-toed variety. To secure an anatomical cure the wide toe is essential. In the great majority of cases, however, all that is needed is to get a boot of the proper length. Most people wear badly-shaped boots, but the majority do not suffer from metatarsalgia. There is one thing to be considered in the ready-made boot, however, and that is that, frequently, if the boot is long enough to give the foot proper room, it is too wide at the heel seat or about the waist of the foot. Consequently, a boot made to order is often indispensable. The made-to-order boot need not be conspicuous. This is a point which we must take into consideration, because many people would rather suffer the pain of the deformity than dress the foot in an ungainly shoe.

There are three things which are essential in a boot or shoe. The first is that the boot be long enough. Shoemakers who are interested in keeping their customers rather than in making individual sales, measure the foot carefully and give the customer a shoe three sizes longer than the foot measures. The shoe size varies somewhat, but the majority are from one-third to three-eighths of an inch; and master shoemakers have long known that the foot covering must be an inch or an inch and an eighth longer than the foot if the wearer is to walk comfortably. The reason for this allowance is that the foot spreads antero-posteriorly from one to two sizes when the full weight is taken. The poorer the tone of the muscle, the greater will be the antero-

posterior spread. (The fact that many of these conditions arise in the flabby foot of the sedentary person of middle life, and that it occurs frequently in the case of soldiers after long marches, shows that the loss of tone may be due either to disuse, or to excessive use. It also shows that one may do ordinary work in a boot that is too short, with comparative impunity.) The need of the third shoe size may be illustrated to the patient by showing that, when the foot and the sole are in contact, they form two curved surfaces at the end of each step. The outer of two curves so placed must be slightly longer than the inner if the inner is not to be distorted. It is also necessary to allow for variation in the thickness of stockings. The second essential is that the sole of the boot be flat from the toe to the shank, and that the heel be of moderate height. With wear, the sole tends to turn up at the toe and, if it is of the rocker type at the start, it becomes a progressively pernicious splint. In the matter of the heel, one must not be too insistent in running counter to the dictates of fashion. For an anatomical cure, the lower the heel the better, but for practical purposes, one can get on very well with a heel about an inch and a half high. However, as is well-known, the height of the heel is to be governed by the angle of voluntary extension of the ankle. The last essential is that the boot shall fit snugly about the heel and waist of the foot. To obtain this, as has already been observed, it will be necessary to have boots made for many cases.

If it is necessary to have a boot to made order, the surgeon must see to it that the boot is made according to his specifications. Shoemakers are almost certain to make a boot to fit the deformity. This may feel comfortable temporarily, but it does not permit of the cure desired and only tends to aggravate the condition later. It is in these cases which must have special boots that particular stress must be laid on having the boots tight at the heel and waist. A snug-fitting boot at the waist immediately corrects part of the excessive spread in the phalangeo-metatarsal joints.

Many forms of splinting have been advocated for the correction of this trouble, from a bar across the sole to a plate made over a corrected plaster model. All have their fields of usefulness and their limitations. In the more severe types, a stiff leather splint, properly shaped, with a lift just behind the metatarsal heads, and fitted with loops by which the toes can be tied

down, is of advantage. This corrects the faulty transverse arch and allows for continuous stretching of the extensor and flexor tendons. By wearing this about the house at night and in bed, the patient can get on and be about his business through the day with a more simple splint. The most satisfactory thing is a pad of saddler's felt, half an inch thick, trimmed to correct the most faulty part of the transverse arch, and sloping from that in all directions. Hold this in place by a wide band of strong elastic. The more carefully the pad is fitted, the greater the success. In the majority of cases, it is the only thing that is needed in the way of a splint.

But splinting alone will not effect a cure. The intrinsic muscles of the feet must be developed to the point of sustaining the transverse arch in a painless position. These muscles are best trained by teaching the patient to regain the prehensile power of the foot.

This cannot be done without the assistance of a masseur. The foot must be rendered supple by heat and massage and then the training of individual muscles should be begun. That means, of course, that the masseur must be properly trained. He must know anatomy thoroughly—not only the origin and insertion of the muscles, but particularly the action of the individual muscle and its synergistic group. This is a matter which cannot be taught in a short course. The best-trained masseurs are those possessing certificates from The Incorporated Society of Trained Masseurs, England; but even with these, the work of the masseur must be supervised just as carefully and intelligently as the work of a nurse is watched in a case of typhoid. There is a lamentable ignorance on the part of the profession in general, as to the scope of massage and muscle-training.

The exercises which have proved most effective are those which begin with flexing the phalangeo-metatarsal joints. This can be done over a bar of wood curved to fit the transverse arch, and fixed so as to give resistance. Ladder-climbing in very soft-soled shoes, or barefooted, provided the toes are turned well in so that the rungs come behind the ball of the foot, is also very efficacious. Picking up articles with the toes should be attempted. Small objects like marbles are not of much advantage because they are picked up by the action of the flexors alone. Larger objects, like golf balls, demand the use of the lumbricales and interossei. One should try

even as large an object as a tennis ball in order to develop the transverse head of the adductor hallucis.

It is not necessary to carry this training to the point of performing freak tricks with the foot. If one secures sufficient tone in the muscles to relieve the pain permanently, that is enough. The length of time required to do this varies with the individual. A few patients will get on very well with half a dozen lessons. Others need continual supervision over a period of weeks or months, but if there is a properly trained masseur to follow the corrective splinting by muscle training, there is no case of metatarsalgia which cannot be cured without operation excepting, of course, such cases as are due to nerve involvement. Tenotomy may perhaps expedite the cure, but it is not essential. The same statement holds good for hallux valgus. The only value of an operation in the latter condition is a removal of the bony deformity. There are, of course, cases wherein the element of time is an important factor and operative interference is advisable. In these cases, however, only the minimum of operative interference is justified.

In conclusion, I would urge the attention of the profession to proper footwear. Let me repeat that every doctor should know what a shoe size is, and why the proper size should be worn. Bad shoeing usually begins in adolescence and little can be done to educate the general public, but the ignorance which exists on the part of the profession as to the crippling effect of short boots, is little short of criminal. If the

evil is generally recognized, a great deal can be done in the way of prevention by the doctors in the schools. Every doctor in that work should provide himself with a shoe measure, and should know its use. Shoe factories have various methods of marking, and sometimes the size varies widely from that quoted as ordinarily accepted. Confusion results. However, if measurement is made above the heel, allowing one shoe size for the thickness of the counter at the heel and the toe cap, the correct size of any shoe may be obtained. Where exceptional sizes are in use, instruct the patient to get a shoe an inch and an eighth longer than the foot. The more the pointed toe appeals to the person concerned, the longer the boot must be.

It is a pleasure to note that this subject, which has been discussed ever since shoes displaced sandals, has been written on this past winter by men widely separated geographically, but at one in intelligent treatment. Since my notes appeared in *The Lancet*,¹ Drs. Mennell, Whitman,² Cross³ and Roux⁴ have shown an appreciation of the possibility of obtaining relief in these conditions by training the muscles controlling the part.

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SURGICAL CLINIC OF DR. F. N. G. STARR

TORONTO GENERAL HOSPITAL

REPORT OF TWO CASES OF ACUTE PANCREATITIS

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CASE No. 1—*Acute Suppurative Pancreatitis, associated with Cholelithiasis.* Miss E. B. W., age forty. Referred by Drs. Bryans and Goldie. Admitted to Toronto General Hospital November 16th, 1920.

Patient had to be taken to hospital on a stretcher, and complained of pain in the epigastrium, sick stomach, and loss of appetite.

Date and Mode of Onset. Two years ago this patient suffered from her first attack of acute pain in the upper mid-abdomen, which did not radiate in any particular direction, did not confine her to bed, and lasted only a few days. She has had since that time recurring attacks of pain in the right epigastrium, radiating around the lower ribs to the back. These attacks are varied in duration, and some of them extreme in character. Such an attack started on October 15th, beginning with severe pain and vomiting; the vomitus having the appearance of coffee grounds. This attack has not subsided as the former one. From notes received from Dr. Goldie, it is stated that this pain persisted, with sharp exacerbation and a rise of temperature varying from 99.2° to 102.5°. This kept up for a period of two weeks. There was an absolute distaste for food, and an inability to retain much of what was taken. At the end of the second week there was rigidity of the upper right rectus, with marked local tenderness under the right costal margin, at the edge of the rectus muscle. The rest of the abdominal wall gave no evidence of rigidity on palpation, nor were any other tender points made out. The week previous to her admission to hospital there had been practically no rise of temperature. The pain had subsided to a great extent, as far as the right upper abdomen was concerned, but in the left upper abdomen the patient complained of an indefinite pain. There has been no history of jaundice at any time.

Condition on Admission. Patient looked extremely ill, and showed the evidence of her previous suffering. There was almost complete absence of muscular rigidity in the right upper abdomen, but in the left upper abdomen, just above the umbilicus, there was an indefinite sense of resistance, which was not due to muscular rigidity, and this area was extremely tender on pressure. This area was slightly resonant on percussion. Temperature was 99° and the pulse rate 80 per minute.

Laboratory Reports. Urinalysis showed nothing abnormal. White blood count, 8,500. Red blood count, 5,000,000. X-ray examination of the gastro-intestinal tract by Dr. Dickson reported adhesions around the gall bladder, fixing the second portion of the duodenum; also in the left upper abdomen there was a constant shadow, which encroached upon the stomach and the transverse colon, which could not be explained.

Diagnosis. In view of the fact of her pain and tenderness in the right upper abdomen, it seemed obvious that this patient was suffering from a gall bladder lesion. Because the nausea was out of all proportion to the other symptoms, the diagnosis of pancreatic involvement was suggested by Dr. Goldie early in the attack, and when seen on admission to hospital, the indefinite fulness to the left and above the umbilicus, together with the tenderness in this area, confirmed our suspicion of pancreatic involvement.

Operation. Dr. F. N. G. Starr operating. Near mid-line upper abdomen incision exposed a tumour mass, which was evidently an enlarged pancreas. The gall bladder was a pale, muddy color, markedly free from adhesions, but thick-walled, and quite enlarged, and contained a number of stones. The enlarged gall bladder encroaching upon and deforming the duodenal cap, explains the x-ray finding. On investigating the tail of the pancreas, from which the tumour

mass was apparently arising, one's finger slipped into an abscess cavity, the result of a suppurative pancreatitis. The great omentum showed numerous areas of fat necrosis. The appendix and cæcum were not disturbed for fear of dissemination of the infection. A swab was taken for culture. The gall bladder was opened, and a small amount of clear mucoid material was evacuated, containing flakes of fibrin and many stones. A tube was sewn into the opening in the gall bladder, by means of two purse-string sutures of iodine catgut. The general peritoneal cavity was walled off from the gall bladder region by means of a coffer-dam of gauze. The tube and gauze emerging from the peritoneal cavity through a stab wound under the right costal margin. A stab wound was also made in the left loin, and a tube situated in the abscess cavity emerged through this opening. The opening in the abscess cavity was again separated from the peritoneal cavity by strip-gauze packing, which was brought out through the abdominal incision. The abdomen was closed in layers.

Progress. The patient on returning to bed suffered a considerable amount of shock. Forty ounces of saline were given interstitially; a Murphy drip of ten per cent. glucose; ten per cent. soda bicarbonate; concentrated tincture digitalis—two drachms to a volume of ten ounces. When this amount had been given, the Murphy drip was discontinued for four hours, and again started with the above content, excepting the digitalis. The gauze around the gall bladder was loosened on the second day, and removed on the third day. The gauze around the pancreatic drain was removed on the fourth day. The pancreatic drain, from which a small amount of sero-purulent fluid had been discharging, was completely removed on the fifth day, after which there was practically no discharge. The temperature for the first three days ranged from 100° in the morning to 102° in the evening, after which time it became normal, and has remained so. The convalescence otherwise has been uneventful, the gall bladder drainage being removed on the fourteenth day, there still being a slight discharge of bile. The one troublesome factor has been the fact that this patient found it almost impossible to sleep during the night, but is able to secure four or five hours' sleep during the day. She was out of bed for the first time on the sixteenth day, and 6-12-20 her condition is so satisfactory that she is to be discharged from hospital.

Laboratory Report. Analysis of urine shows nothing abnormal. Culture of swab taken at time of operation was sterile.

CASE No. 2. Acute Hæmorrhagic Pancreatitis, Associated with Cholelithiasis. Mr. F. S., age fifty, married, presented himself at the Out-patient department 5-2-20, complaining of attacks of pain in the epigastrium, coming on at intervals.

General Appearance. Pale, ill-nourished; has an anxious expression.

History of the Present Condition. Patient was well until April, 1919, when half an hour after eating his breakfast, he was suddenly seized with a very severe pain in the left upper abdomen, which was not localized in any particular area. It did not radiate to any other part of the body; was not relieved by change of posture, nor by lying still. It required two hypodermic injections of one-quarter grain of morphia each. At the end of twenty-four hours his pain had entirely gone, but he felt so wretched, as the result of the ordeal, that he was off work for two weeks. In October, 1919, he had an attack of the same character, which again necessitated his stopping work for two weeks. Since that time he has often complained of a lump-like feeling in the oesophagus and epigastrium immediately after eating his meals. These attacks lasted for half an hour, and were relieved by "dyspeptic tablets". Towards the end of November he again had a very similar attack, and the discomfort after taking food has markedly increased. He suffers from what he calls a "heavy feeling in his stomach", and since Christmas has been very listless and lacking in energy, being unable to accomplish much work in a day. On the fourth of January, 1920, he again had an attack, which was more severe than any one previous, and has felt so miserable since that he has been unable to work.

Family History and Past Illnesses. Have no bearing on the present condition.

General Examination. He is very thin, pale, and looks distressed. Weight, 130 pounds. He has a very poor appetite, and often passes undigested food. He has immediate epigastric distress on taking food, which lasts for one-half to one hour, sometimes associated with nausea, and rarely with vomiting. Bowels move daily without a cathartic. There is no history of having passed blood or mucous. He has very little headache. Examination of the respiratory

system shows nothing abnormal. There is a remarkable freedom from arterio-sclerosis. Blood pressure, systolic 120; diastolic 100. Genito-urinary system shows nothing abnormal. Denies venereal disease. Nose, throat and ears show nothing abnormal. Teeth have all been extracted, and he wears plates. No Romberg sign present. Eyes react to light and accommodation. Superficial reflexes present and normal.

Abdominal Examination. Abdomen scaphoid; no bulging or muscular rigidity; no tenderness on palpation; no mass palpable. Neither kidneys nor spleen are palpable. Liver is not enlarged. There is no free intra-peritoneal fluid. Advised to enter hospital.

Admitted to hospital 5-2-20, directly from outpatient department.

Laboratory Examination. Urinalysis shows nothing abnormal. White blood count, 6,800; red blood count, 4,400,000. Blood Wasserman, negative. X-ray examination of the gastrointestinal tract, after ingestion of a barium meal, shows nothing abnormal.

10-2-20. Without any apparent reason, this patient suddenly developed an attack of acute abdominal pain, associated with cyanosis, an extreme degree of shock, and very rapid and feeble pulse. He became exceptionally restless, writhed in bed, and complained of a diffuse pain in the upper abdomen. There was no muscular rigidity; no localized tenderness, and no abdominal distention. He vomited once or twice as the result of the pain. After half an hour hypodermic injections totalling half a grain of morphia had no effect whatever on the pain, and a light ether anaesthesia was given over a period of half an hour. The acute pain persisted for about two hours in all, gradually lessening at the end of the first hour, and in the evening the patient was reasonably comfortable, and slept well that night. Urinalysis following the acute attack showed a slight trace of albumen, and a few hyaline casts. The next morning, however, he seemed to be still suffering from a degree of pain in the upper abdomen, and it was considered advisable to undertake surgical relief.

Diagnosis. In view of the history of this man's gastric disturbance, and the history of his attacks of pain which ended suddenly, but left him exhausted, a diagnosis of cholecystitis and colelithiasis was made. In addition to this, the severe degree of shock and pain associated with the acute attack which he developed in hospital, together with the diffuse tenderness

and pain in the upper abdomen, which was not relieved or made worse by lying still or by changing posture, the diagnosis of acute pancreatitis was added to the above.

Operation 11-2-20. Dr. Roscoe R. Graham operating. Gall bladder incision was made, with an extension upwards towards the ensiform cartilage. On opening the peritoneal cavity, a fair amount of blood-stained fluid escaped. Small bowel presented, which was reddened and distended, showing much more evidence of an acute lesion than the large bowel, which was collapsed beyond the splenic flexure. On the great omentum were many areas of fat necrosis. The gall bladder was thick-walled, and contained stones. There were no adhesions about the gall bladder. Could feel no calculi in the common bile duct, but there was a very marked hæmorrhagic exudate around this structure. The pancreas was quite three times the normal size, with much hæmorrhage in it, and was very tense and firm on palpation. Removed the gall bladder and stones, and drained the common duct. An opening was made through the anterior layer of the lesser peritoneal sac, above the stomach. The pancreas was then bored into by the finger. There was a fair amount of bleeding following this procedure, but it was easily controlled by strip-gauze packing. A tube was put down to drain this area. At this stage the patient was in very poor condition, and the abdomen was rapidly closed.

13-2-20. Following the operation, the patient's pulse became alarmingly rapid, and very feeble. Forty ounces of six per cent. gum acacia were put into his vein, and interstitial salines were given, but despite our best efforts, the patient succumbed on the evening of this date.

Autopsy Report. Pancreas: Weight, 370 grams. Measures 18 cms. long by 6 cms. wide by 3 cms. deep. Pancreas was fairly firm in consistency. The peri-pancreatic tissue was filled with hæmorrhagic exudate. In the head and tail of the gland were found two small areas of what appeared to be very congested, but otherwise normal, pancreatic tissue. The remainder of the pancreas was mottled, and reddish brown in colour, with very dark areas scattered throughout. Near the head of the pancreas there was a fairly large area, which was softer than the rest of the gland, and is apparently undergoing necrosis. The duodenum throughout its whole length was dilated to three or four times its normal size, and the mucous membrane showed three or four

whitish plaques about twice the size of a pin-head. The remainder of the gastro-intestinal tract was apparently normal. The common bile duct and hepatic ducts were opened in situ, and were apparently normal. The duct of Wirsung leading to the pancreas could not be identified. Pleural cavities: Near the vertebral extremities of the ribs, there were a number of yellowish white chalky-looking areas about the size of a grain of wheat, slightly elevated above the surface. These appeared to be areas of fat necrosis. Through out the omentum and surrounding tissues, there were many areas of fat necrosis varying in size from that of a pin-head to a grain of wheat. Histological examination of the pancreas showed large areas which were degenerated, with much hæmorrhage in them. In sections from many areas one found but few islands of Langerhans which were not markedly degenerated and filled with hæmorrhage.

Comment. In the pre-operative history of both these cases, there is a striking similarity. It is of great interest, and indeed difficult to explain, why one should end in the suppurative, and the other in the hæmorrhagic type of pancreatitis. Ever since Opie reported his classical case of ball-valve action, due to biliary calculus in the ampulla of vater, which intermittently occluded the biliary outflow of the duodenum, and forced bile into the pancreas, causing acute hæmorrhagic pancreatitis, there have been many theories advanced to explain the relationship between pancreatitis and biliary lesions.

Opie contended that if a stone lodges in the ampulla of vater and occludes both the pancreatic and bile duct, chronic pancreatitis takes place; but if it is small, and blocks the ampulla below the level of the pancreatic duct, then acute pancreatitis will follow.

The fact, however, remains that in this as well as other clinics, there are encountered many instances of chronic pancreatitis in which no calculi can be demonstrated in the common duct. In the acute hæmorrhagic case here reported, it will be noted that the common duct and ampulla were apparently normal. Hence, if we are to explain pancreatic disease of this type by the regurgitation of bile into the pancreas, which from experimental data appears to be the correct view, then we have to seek further than the obstructive mechanism of stone in the duct.

Two other factors must be taken into consideration in this connection. Firstly: Practically all cases of pancreatitis, whether acute or

chronic, are associated with biliary disease, with or without the formation of calculi. May not the reaction to infection, or trauma from passing stones, have caused a stenosis of the opening from the ampulla into the duodenum, thus preventing free exit of the bile, with some degree of flow into the pancreas at all times? Secondly: Archibald, of Montreal, demonstrating that the sphincter of oddi does exist at the opening of the ampulla into the duodenum has proven that it is very real. He has demonstrated experimentally that it will withstand a real pressure within the bile duct, before it will allow the contents to flow into the duodenum. There is also every reason to believe that this sphincter is controlled by the autonomic nervous system, as are the pyloric and ileo-cæcal sphincters. We know that in digestive disturbances such as these patients complained of, there is spasm of the pylorus and ileo-cæcal sphincter, and there is no reason to doubt that spasm occurs at the same time in the sphincter of oddi. This fact could easily explain the regurgitation of bile into the pancreas, because of a persistence of spasm in this area, which was initiated by the biliary lesion.

The explanation of the suppuration in the first case is very interesting, particularly in view of the fact that culture of the contents of the abscess cavity proved to be sterile. Is it not highly probable that the suppurative area was formerly a part of an acute hæmorrhagic pancreatitis the remainder of the gland being involved to a degree which still permitted of practically a complete return to normal. A convincing factor will be if this patient, in the course of the next few years, should develop diabetes. At the present time, however, it is worthy of note that the urine shows nothing abnormal.

Again, in view of the fact that the contents of the abscess proved to be sterile on culture, it is difficult to explain the temperature. We know that all pancreatic disease is as a rule afebrile. The period of greatest pyrexia in this case was associated with pain and muscular rigidity in the right upper abdomen, and was prior to any tenderness or palpable mass to the left of the middle line. Thus one would draw the conclusion that the suppurative focus in the pancreas had nothing to do with the elevation of temperature, which was caused by the infection in the gall bladder and bile ducts. If this is the correct analysis, then it is interesting to note a pancreatitis of four weeks' duration ending in sup-

puration at this late date, and followed by recovery after operation. This is the latest date of operation coincident with recovery, according to Korte, who operated upon seven cases during the fourth week, with three recoveries and four deaths, and in the fifth week operated upon four cases, all having a fatal issue. In acute hæmorrhagic case, the question no doubt will arise: "Why was operation not done in the day of the acute attack, which developed while the patient was in hospital; particularly in view of the fact that acute pancreatitis was diagnosed as a part of his lesion?" This can immediately be replied to by asking, "When is the most favourable time for operation in acute pancreatitis?" In this connection it is interesting to note that Korte, in his very thorough and scientific paper on this subject in 1894, advised against operation during the acute stage, and that later, in 1910, in a paper published in the *Annals of Surgery*, he was obliged to reverse his decision, and advocated early operation. In the case in question, however, a formidable operation during his acute attack appeared to offer no hope of a successful issue, because of the extreme degree of shock from which the patient was suffering. Later in the day, when the pain subsided, the patient volunteered the information that this was of a similar character to his former attacks, only more severe. It was then logical to suppose that, in the light of his past history, he would recover sufficiently to offer a possibility of a successful issue as the result of operative interference. As far as one could tell from his clinical condition the next day, this hope seemed to be justified. The fact remains, however, that there was a fatal issue. The question one has to answer is, "Why did the man die?" In this connection, two factors must be taken into consideration. First, shock of operation; second, destruction of pancreatic tissue. We have all seen recovery from very severe intra-peritoneal lesions, which required even more formidable operative procedure than were undertaken in this instance. In the light of the experimental work of Coffey, one strongly suspects that the destruction of pancreatic tissue was probably the deciding factor. He has proven the absolute necessity of the islands of Langerhans, which appear to furnish the internal secretion ascribed to the pancreas. In dogs he has been able to divert the whole of the other pancreatic secretion from the gastro-intestinal tract, and has found that after a few days the dogs were

able to carry on a normal metabolism. In other words, just as the pancreas is able to take on a compensatory work for the other digestive juices, so the other digestive glands can respond in the same way in the absence of pancreatic juice. However, in other dogs he has proven that if the islands of Langerhans are destroyed, death is inevitable, because their secretion appears to be absolutely essential to the proper correlation of the secretions of the other endocrine glands, such as the thyroid, pituitary body, the adrenals and the testicles or ovaries. In this case histological examination showed that there were very few islands of Langerhans which escaped destruction, and they would probably be incapable of producing sufficient internal secretion to carry on life, and thus we can explain our fatality apart from the operative shock.

As to the reasons for drainage of the pancreatic area, and boring into the body of the pancreas with the finger, we know that as long as one provides free exit for pancreatic juice, that its presence in the peritoneal cavity is no more dangerous than bile. For this reason one must aid direct drainage of the area to prevent further fat necrosis and destruction of the gland, because attacking the gland with the finger in this manner will not destroy normal pancreatic tissue, but will provide a means of exit for any locked-up extra peritoneal pancreatic juice, which when confined rapidly produces very great destruction.

The conclusions which one would draw from these cases would be the fact that pancreatic disease and biliary disease are very closely allied; that the biliary disease precedes and is responsible for the pancreatic lesion. It is well recognized that the vast majority of acute lesions of the pancreas are either incorrectly diagnosed, or else are not diagnosed until the unfortunate individual reaches the post-mortem room. Thus we feel that in upper abdominal pain, which comes on suddenly, associated with an extreme degree of shock, and a peculiar cyanosis, one can be put on their guard, and at least suspect pancreatic involvement, if the previous gastro-intestinal history is of the type which we have learned to associate with chronic gall bladder disease. In view of the fact that the hæmorrhagic case gave a history of attack similar to the final one, it is not inconceivable that there are many instances of acute hæmorrhagic pancreatitis which remain undiagnosed, and which recover without operative interference. The comforting factor in this hypothesis is that

one probably is justified in refraining from operative interference in the acute attack while the patient is still suffering such a severe degree of shock as the result of the pain. There is also comfort in the fact that in some of the fatal operative cases at least, the result can be attributed to the terrific destruction of the islands of Langerhans, quite apart from the operative procedure employed. It will be noted that in the pre-operative history of both these cases, and particularly in the hæmorrhagic pancreatitis,

that these patients complained of pain in the left upper abdomen just above and to the left of the umbilicus over a long period of time. One finds that this pain is complained of, and also that this area is painful on palpation when investigating patients who are the subject of chronic gall bladder disease. May not this clinical finding be of sufficient importance to urge a more rapid recourse to surgery in such instances, and avoid the possibility of a disastrous pancreatic lesion developing?

CONTINUOUS FEVER IN CHILDREN WITH STREPTOCOCCIC INFECTION IN THE BLOOD STREAM, WITH RECOVERY

CASE REPORTS

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THE hæmolytic streptococcus as a secondary invader has been much discussed since the pandemic of so-called Flu. Its significance in relation to many atypical clinical conditions during and following influenza is now generally appreciated. A great fund of facts in relation to it has been accumulated by the intensive study given it especially as it occurred in army cantonments. There still exists much confusion about many details in relation to the streptococcus in general, as for example the classification of streptococci. This general study has brought out, however, many important features not encountered or little appreciated before this pandemic, which are now generally recognized. An interesting complication is that encountered in this paper.

That a child, soon after influenza, can run a low grade temperature for four to six months with so general an infection as to give a positive blood culture for hæmolytic streptococcus and recover with apparently little or no permanent physical disability, or recover at all, is to me, an interesting clinical fact. It is an experience I believe I have never encountered previous to

these last two years. Apparently it has occurred frequently in cantonments of soldiers. The meagre references encountered in the literature to similar cases in children, in an attempt to satisfy my anxiety as to the outcome of these particular children, prompted me to an extensive reading of the literature on hæmolytic streptococci extending now over many months; and to write this paper with the idea that it might be of service to others who might also be going through such a trying experience.

What are some of the important considerations of the hæmolytic streptococcus from our point of view as clinicians? These might be summed up as follows:

(a) Has the hæmolytic streptococcus a normal habitat in the tonsils?

(b) Under what conditions may it be pathogenic? (1) Increased invasive characteristics. (2) Its physical and chemical change, i.e., mutation.

(c) What are the routes by which a general invasion occurs? (1) Blood. (2) Lymphatics, ascending or descending.

(d) What decreases its activity? (1) Sunshine. (2) Fresh air. (3) Food. (4) Vaccine. (5) Tonsil enucleation.

The hæmolytic streptococcus as a normal inhabitant of the tonsils, in the sense that the staphylococcus albus is of the skin, cannot be proven in the light of our present knowledge. This organism often does, however, occur in large numbers in pharyngeal mucosa in normal persons, and in persons suffering from acute infectious diseases. Cultures from the surface of the tonsils are positive more frequently and more strongly than from any other area in the nasopharynx and crypt cultures in vivo give a positive in a higher percentage of cases than surface cultures, while crypt cultures of excised tonsils are positive in a still higher percentage. Hæmolytic streptococci have been found in swab cultures in 61 per cent. and in crypts in 97 per cent. of excised tonsils showing chiefly hyperplasia.

The frequent occurrence of positive hæmolytic streptococci cultures obtained from the tonsils and pharynx in apparently normal individuals during the epidemic of measles in the army cantonments in 1917-1918 was a matter of wide spread interest. Groups of apparently normal persons became carriers in 83.2 per cent. (Levy and Alexander¹), 70 per cent. (Irons and Marine²), 83 per cent. (Fox and Hamburger³), and 45 per cent. (Knowlton⁴) where six months before, the same groups or similar groups yielded but 15 per cent. The relation of chronic carriers to the development of a streptococcus epidemic is uncertain and must remain so until means are available for showing whether the hæmolytic streptococci harboured by them are identical with these responsible for the epidemic. The theory of contact infection is the only logical one with respect to these epidemics. There is some evidence, however, that the streptococcus isolated from the throat and from empyema exudate are identical biologically.

Under what conditions does the streptococcus hæmolyticus become pathological? Three possible factors may become concerned in the production of secondary streptococcus infections. (1) The existing dormant organism in the tonsil or throat may become enhanced in its virulence through symbiosis or by the primary virus as influenza, measles, scarlet fever, pneumonia, etc. Mutations are believed to occur in humans under certain favourable conditions (Lewis, D. M.⁵). The widest extreme that is classical, is the isolation of a pneumococcus from an endocarditis which settles down to the later laboratory life of a hæmolytic streptococcus. The evidence also

points to the fact that all non-hæmolytic strains are methæmolytic producers when grown on suitable media. (2) They may become active through the lowering of resistance of the respiratory passage. (3) They may attain increased invasive powers through the lowering of general resistance of the host. Probably all three factors are combined.

It has been suggested that leukopenia and diminution of phagocytic activity of the leucocytes in influenza may account in some degree for the severity and frequency of secondary infections in this disease. In general the more virulent the organism, the more distinct is the capsule and the less susceptible are the cocci to phagocytosis.

What are the routes by which general invasion occurs? The two routes of invasion are through the lymphatics and blood stream. One is profoundly impressed on reading the literature with the relative infrequency with which the organism is isolated from the blood stream. This in itself points strongly against invasion as a rule directly from the tonsillar tissue into the blood stream, although probably this does occur to some extent. The infection may be ascending or descending, in the former sinusitis, otitis media, and mastoiditis, or descending in the later laryngitis, bronchitis, pneumonia, and the frequently met with empyema. The analogy has been made to the tubercle bacillus which not infrequently passes down through the cervical glands, and through the thoracic duct, and right heart, finally invading the lung through the lesser circulation, and never appearing in the blood stream.

A summary of the literature on the frequency of blood cultures of any organism in influenza and its complications shows such wide variation of opinion as to make a rather chaotic affair and I make no attempt to present it. In not a few instances when numerous blood cultures were obtained, no organism was found. In other instances they varied from almost none (Fleisher and Hamilton⁶), to 50 per cent. (Hirsch and McKinney⁷). These instances may be given as evidences of the wide variations in the frequency of any growth at all, streptococci or other organisms.

The assertion is made (MacCallum⁸) in a monograph on the pathology of the pneumonia in United States Army camps during the winter of 1917-1918 that blood cultures taken from human cases during the course of broncho-

pneumonia and empyema are almost always sterile except in the terminal phases of the disease. Whether in many instances organisms do not get into the blood in sufficient quantities to produce a growth, or whether in some instances with repeated blood cultures a positive culture might not more often be found, are interesting problems, but still disputed. That it may occur as a blood stream infection there is no doubt. Why it occurs so infrequently and inconsistently is yet to be demonstrated.

Recoveries when blood cultures were positive for streptococci undoubtedly have occurred in far more instances than are gathered from the literature. Apparently little attention was given to this feature in the study of the army camp. However, recoveries where positive blood cultures were obtained have been recorded in several instances.

What measures may be resorted to, to combat this condition? While it may be possible to eradicate some of the streptococci from the tonsillar crypts with various antiseptic solutions the feeling is general that excision of the tonsils offers the highest percentage of cures in the so-called carriers, although excision of the tonsils does not necessarily mean that the individual is free from hæmolytic streptococci. Fresh air, good food, and sunshine are important factors in combating this organism.

CASE REPORTS: April 1st, 1917, male child, three and a half years old.

Past History. Full term. Normal birth. Birth weight, eight pounds. Breast fed six months. At birth there was a systolic murmur over the base of the heart, no enlargement. This murmur disappeared in two weeks, and on subsequent examinations it was never heard again. Pneumonia at thirteen months. Tonsillitis at two years. Four months later, German measles. At two years ten months, looseness of movements lasting one week, two to three a day with no elevation of temperature. November, 1918, was in the Harriet Lane Hospital for children at the Johns Hopkins Hospital with a temperature of 105° for four days with a head cold and no other clinical signs. His white count was 4,200. The diagnosis of flu was made.

Present Illness. Apparently perfectly well until five weeks ago, when appetite failed and he acted at times as if tired.

Physical Examination. Well developed and well nourished child. Skin and mucous membranes good colour. Pupils equal and react.

No nystagmus, no strabismus. Cervical glands showed slight enlargement. Teeth all in good condition. Tonsils considerably enlarged. Chest well formed. Heart: not enlarged, rate 80, systolic murmur rather loud, heard all over precordia; greatest intensity at the apex transmitted to the axilla distinctly, murmurs not altered by holding breath. Lungs: no râles, no alteration in breathing, no dulness. Abdomen: slightly distended, no tenderness, no masses. Spleen not palpable. Liver not palpable. Extremities: reflexes normal, no Kernig.

Treatment. Immediate operation on tonsils was advised. Child ordered to bed.

April 7th. Tonsils removed, the left contained considerable pus. A culture was made and showed a growth of hæmolytic streptococcus.

May 4th. The child had a fair convalescence; temperature remained normal most of the time, with only an occasional rise to 100.5° (rectal). No improvement in appetite.

May 16th. Colour pale. Slight daily rise in temperature, occasionally 100.8° (rectal). Ears normal. Throat slightly injected. Lungs normal. Heart not enlarged, systolic murmur clearly audible. Abdomen soft, no tenderness. *Blood.* White count 13,000. Differential count: mononuclear cells 30, polynuclear cells 70. Radiograph of chest: No peribronchial thickening, no enlarged bronchial glands. *Urine examination.* No albumen, no sugar; sediment, a few leucocytes.

May 27th. Feels fine. Full of life. Colour not good. Systolic murmur distinctly audible. Pulse 88. Blood culture positive for hæmolytic streptococcus. Temperature twice daily 100.5° (rectal). White count 8,000. Differential count: polynuclear cells 25, large mononuclear cells 38, small mononuclear cells 25½, transitional cells 6½, eosinophiles cells 4, myelocytes 1.

June 15th. Still in bed, active, full of life. Still runs temperature once a day or once in two days reaching 100.5°; after a nap it drops down to 99.2° or 99.6°. The heart rate is 88 to 90. An autogenous hæmolytic streptococcus vaccine was begun one week ago starting with 3 m. of a dilution of 30,000,000 dead bacteria to one c.c. This gave a slight local reaction. Increased each third day, care being taken not to get more than a slight local reaction.

June 20th. Each second or third day temperature 100.5° to 100.8° at each reading. Looks fine. Murmur almost inaudible. Now getting about 1,000,000,000 dead bacteria twice a week. Eating poorly.

July 5th. Sent to the salt water, allowed to get up and play on the beach. Murmur gone. Temperature 100.2° to 100.5° once in 3 or 4 days. Appetite improved.

September 15th. Blood cultures negative for hæmolytic streptococci. Temperature normal. No murmur. Apparently well.

June, 1920. For many months this child has been perfectly well. Murmur has entirely disappeared.

December 25th, 1918, male child age three years.

Family History. Father and mother both well. One brother six years old is well. One sister died ten years ago at eighteen months of age of tuberculous meningitis.

Past History. Full term. Normal birth. Birth weight seven and a half pounds. Breast fed two months, then whole milk modification of certified milk. Progressed perfectly well until present illness. During the height of an epidemic of influenza in November, 1918, the boy was exposed to infection from father who had pneumonia. The boy came down with influenza shortly afterwards and ran a fairly severe course for about five days, followed by two days of practically normal temperature. Then, while the boy was still in bed, a severe broncho-pneumonia set in with elevation of temperature for thirteen days.

Present Illness. After eight days of normal temperature a slight rise of 100.4° (rectal) took place, on the following day it rose to 100° four times. No cough. Eating well. Put to bed.

Physical Examination. Temperature 100.3° (rectal). Well developed and fairly well nourished. Skin pale. Mucous membranes fairly good colour. Head: no retraction, no rigidity. Pupils equal, and react. Glands: cervical very slightly enlarged. Throat: tonsils moderately enlarged, no redness. Lungs: no dullness, no altered breathing, no râles. Heart: left border, one finger's breadth outside nipple line, right border at right sternal border, systolic murmur at apex transmitted to axilla. Pulse rate 112 lying down. There was considerable variation in rhythm with the slightest emotion, even while smiling pulse rate would jump to 120. Abdomen soft, distended moderately, no tenderness. Spleen not palpable. Liver just palpable. Extremities, knee jerks present and equal, no Kernig. The child was ordered to lie flat on his back for one month.

February 1st. Still in bed with one pillow. Pulse rate has been as low as 96, usually 104 to 108. Temperature ranges much the same. Eating well. Urine normal.

March 31st. Still in bed. Heart, precordial dulness same as at first. systolic murmur greatest intensity at third left interspace. Blood pressure: systolic 90, diastolic 55. Temperature for three nights 100° to 100.6° . Pulse 104 to 106. White count, 10,000. Differential count: mononuclear cells 37, polynuclear cells 63.

April 1st. Still in bed, but sitting up. Condition unchanged. Eats well. X-ray of chest: apices normal, hilus normal, base normal, diaphragm normal, pleura clear. There is some widening of superior mediastinum which is apparently thymus. The heart shadow is slightly larger than usual.

May 8th. Tonsils were removed, anæsthetic well borne. Cultures from excised tonsils showed hæmolytic streptococci.

June 1st. Still in bed. Temperature 100° to 100.5° each day. Has been sitting up in bed for one hour for the last few days. Blood culture positive for hæmolytic streptococci. Wassermann reaction negative. Noguchi modification negative.

June 13th. Autogenous vaccine 30,000,000 dead bacteria was given with slight local reaction in a few hours. June 8th. 60,000,000, no reaction. June 10th. 60,000,000, slight reaction.

Temperature June 10th, 99.3° , 100.3° , 99.4° . Temperature June 11th, twenty-four hours following vaccine 99.1° , 98.5° , 99.4° . June 12th. 175,000,000, marked local reaction. Temperature June 12th, 99.4° , 100° , 100.1° . Temperature June 13th, twenty-four hours following vaccine 99° each time; in general each twenty-four to forty-eight hours following vaccine temperature ran $\frac{1}{2}$ to 1 degree lower.

July 1st. Sent to beach, allowed to sit up in carriage or on the sand in the sunshine. Eating fine. Heart murmurs disappeared. Heart boundaries the same. Still getting vaccine each three to four days, now given 1,000,000,000 dead bacteria each injection.

August 30th. Walking occasionally. A temperature rarely of 100.2° and pulse 110 while lying down. Still getting vaccine.

September 10th. Blood culture negative. All temperatures running under 100. Heart action appears satisfactory, although as a rule the rate is about 110, no murmurs. Pulse easily raised by slight emotion still.

November 1st. This boy runs and plays about as well as any child. He had, no doubt, an endocarditis and probably a myocardial weakness at the onset. The former boy perhaps did have a mild endocarditis. With the organism circulating in the blood I fully expected other foci of infection. We were apparently dealing with a low grade type of infection, in which rest in bed for months, tonsillar enucleation, autogenous streptococcus vaccine, sunshine, fresh air, and wholesome food were contributing factors in the restoration to health.

I am indebted to Dr. D. H. Hickson, formerly director of the Bacteriological Laboratories of the Puget Sound Navy Yard for the bacteriological work done on these cases.

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The Cause of Cancer.—Every worker who has persisted year after year in the attack on the cancer problem deserves a hearing. His experience and conclusions are likely to help dispel illusions, even if nothing positive is added to our knowledge. Hence we may well listen to the tentative convictions of Paine, who has long been engaged in investigations at the Cancer Hospital Research Institute in London, and who in a recent address (*The London Lancet*, October 2nd, 1920), points out that the clinical features of cancer in man are distinctive and strikingly unlike those of the inflammatory disorders of infective origin, for it is neither contagious nor infectious in the ordinary sense of the terms, nor does it show seasonal prevalence. Pointing out how often cancer arises under circumstances closely associated with the process of inflammation, the response of the tissues to injury which may be either physical or chemical, Paine feels justified in emphasizing the significance of this relationship. He believes that he has observed all stages and sequences from chronic inflammation of the breast, for example, to malignant

mammary cancer. The process begins with inflammation and ends in malignant degeneration. Through the degeneration of the "nobler parts of the cell" whereby its function has been impaired, food brought to it is no longer used in the normal manner. A surplus may accumulate and may perhaps be "equilibrated by growth". In other words, the damaged cell, physiologically altered in its metabolism, starts to grow when its former specialized function is lost. "Nothing to do but grow" might paraphrase the behaviour tendency of the damaged cells. The disturbance in cell metabolism may, of course, be due to toxins of micro-organisms as well as to other noxious agents; but, in the words of Paine, the result of the damage is to disturb the balance of metabolism by impairing the special functions of the cell, and thereby causing persistent overgrowth. As the *Lancet* has pointed out, Paine's conclusions are based on observed variations in the morphology of cells which many persons may be unwilling to accept as conclusive; nevertheless, the deductions are entitled to a careful hearing. —*Journal American Medical Association*.

SOME ASPECTS OF FIBRO-PLASTIC TUBERCULOSIS IN THE EYE

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CASE 1. Some years ago a young girl came to me stating that she had had trouble in her eyes for two years or more and had most of the time been under treatment without benefit. It was a typical case of serous iritis, there being a pronounced tuberculous family history. No other lesion, excepting some enlarged glands could be found. Both pupils were contracted, occluded and secluded, a faint indication only of the fundus reflex being visible in the right eye. She was treated for a year with iodoform injections and there was then a fairly clear reflex in the upper part of the right pupil although details of the fundus were not visible. Suddenly the vision which had been improving became worse, there being apparently round celled infiltration of the media, but nothing to suggest tuberculosis in the attack. During the past five years there has been further determination of vision but no acute symptoms.

Case 2. As a contrast to this case in which active symptoms had disappeared before treatment was begun and only cicatricial tissue remained, the following one affords a very different clinical picture and result.

A man, aged about sixty, came with the pupil of the left eye occluded and secluded, the aqueous was turbid and in the anterior chamber was an exudate membrane which had covered the iris and pupil, but the upper part of which had become detached and was hanging free in the chamber. A single dose of $\frac{1}{4}$ gr. of iodine removed all evidence of plastic exudate and converted the clinical picture into that of septic iritis of a mild type, which soon disappeared. It is noteworthy that the subjective symptoms in this case were so slight, that the patient only had his attention called to the gravity of the condition by being asked by a friend, whether he could see with the eye, when he found that he could not. The fact that it was only after the removal of the plastic exudate that acute inflammatory symptoms supervened, is also worthy of remark.

Case 3. Recently a young girl aged six was

brought by her mother, a trained nurse, who had noticed something strange about the child's eyes. So slight, however, was the change, that the other members of the family could see nothing amiss. Examination showed a faint uniform haziness of both corneae and there was complaint of frequency of micturition by day as well as at night. She was treated expectantly, while a thorough examination was made by her physician; the report was negative, the urine, however, was not centrifugalized. After about two weeks the density of the corneal haze had increased so much that the child could only distinguish large objects. By this time, too, there were marked photophobia and ciliary injection present, while the urinary trouble was causing great distress. From the insidious onset of the disease in the eye, and the irritable urethral condition, a tentative diagnosis of tuberculosis was made. The child was given iodine hypodermically and made an uninterrupted recovery, the urinary condition showing very distinct improvement before any change in the eye was evident.

This case seems to furnish a corollary to the observation published by Clapp (*Am. Journ. Ophth.*, Vol. 2, page 58), that antisyphilitic treatment gives no result in tuberculous interstitial keratitis, and my own cases indicate that little benefit is to be expected from the use of iodine, when this disease is syphilitic in origin.

Case 4. Another case showing undoubted effects of concurrent or intercurrent septic infection was that of a man of fifty odd years of age who had for two years been under anti-syphilitic treatment. The Wassermann reaction was negative at the time when I saw him and remained so. There was no central vision in the right eye owing to degeneration in the macular region, which was of the ordinary septic type. The left eye showed extensive proliferating retinitis in the cicatricial stage, the exudate covering most of the vessels and disc. The vision was 6-60, which under iodine treatment increased to 6-18 and then receded, the loss of sight being due to changes in the macular region.

This case I had regarded as syphilitic, basing the opinion on the history and the statements of certain authors as to changes of this type, and have so reported it (*Brit. Journ. Ophth.*, Vol. 2). It does not, however, conform in type either clinically or pathologically to syphilis or tuberculosis, and an attack of round cell inflammation with acute symptoms which he had while under observation is definite evidence of the presence of some other active factor.

Recently Jackson and Finoff (*Amer. Journ. Ophth.*, Vol. 2, page 715) have reported three cases of retinal tuberculosis with proliferating changes in the eye and referred to two others, but as most of the cases of this character published show no clinical evidence of tuberculosis it has, if present, evidently been greatly modified by some other factor.

These cases illustrate the occurrence of fibro-plastic tuberculosis in several different forms. The clinical picture and pathological changes found in them are quite distinct from those which occur in the type which is characterized by abundant tubercle formation with caseation or necrosis, and the conditions found in the two types are so sharply defined that one is forced to conclude that there is an essential difference in the ætiological factors. In view of the facts, one naturally questions the accuracy of a diagnosis of tuberculosis in these cases or at least whether the tubercle bacillus is the dominating factor in them. Kruckman quoting Von Michael, Graefes' Hand-Book, chap. 6, page 90) postulates the occurrence of serous iritis in the absence of visible tubercle formation but does not go so far as to suggest that the bacilli, too, may be lacking.

There is little doubt that the fibro-plastic exudate often limits, or may even terminate, the tuberculous infection, and many of the reports of this type of inflammation, published, show no clinical evidence of tuberculosis. The Von Pirquet reaction too, is frequently negative.

This fibro-plastic exudate, the main characteristic of these cases, is accompanied or preceded by a round celled infiltration of the tissues which is clinically indistinguishable from the condition associated with plastic exudate in cases not usually considered tuberculous, such as is found for instance, in sympathetic ophthalmia and in some forms of glaucoma.

As fibro-plastic exudate does not occur to the same extent in other forms of tuberculosis it is

probably not due to the tubercle bacillus but to some complicating infection and there are some observations which indicate that certain strains of pneumococci and staphylococci may be the cause of this interesting variant, while the streptococci are active in the more ordinary type of tuberculosis, but, the evidence is limited and incomplete. In searching for analagous conditions in other organs in the body one naturally thinks of lupus vulgaris and fibrosis of the lung. The clinical course in these affections so strongly resembles that in the cases given above, that it is reasonable to conclude that there is a close relationship in the causal factors.

The determination of the germs which are the cause of this type of tuberculosis will naturally have a very practical bearing upon the treatment to be followed. There are, so far as I know, no facts on record which indicate that tuberculin has any effect whatever upon the organisms, present with the tubercle bacillus, in tuberculous lesions, yet the frequency with which one finds various tuberculins recommended, to the utter exclusion of all consideration of mixed infection, is, to say the least, striking. The idea too, of determining just what "mixed infection" implies in connection with tuberculous lesions, as yet does not seem to have assumed a concrete form.

The reports given above show that in the two recent cases the effect of iodine was very prompt and satisfactory while in the others it was not so, emphasizing again the necessity for early treatment, which has so often been insisted upon. The method followed, directly violates the principle of maintaining and strengthening a fibrous barrier around the lesion and strives to remove infection, by preventing its localization and throwing it into the circulation, where it is more easily disposed of, provided that the lesions be not too extensive.

These cases then indicate strongly, the advisability of early treatment and the necessity of more extended research into the underlying causes of the various types of so-called tuberculosis. Whether the facts justify grouping these cases together and including in the category cases of pseudo-glioma and the analogous cases of conglomerate tuberculosis occurring in the anterior chamber and anterior part of the uvea, and whether the tuberculous infection dominates the disease sufficiently to justify a diagnosis of tuberculosis, is open to question, and I should be very pleased to hear the matter discussed.

RECURRENT DISLOCATION OF THE SHOULDER JOINT

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DIFFERENT joints in the body owe their strength to different factors. In some the shape of the bones taking part in the articulation is in itself an obstacle to dislocation. This is notably so in the hip-joint and in the humero-ulnar articulation. In other joints, strong ligaments serve to keep bony surfaces in apposition. The knee joint is a conspicuous example of this kind. Still other joints depend mainly on the action of muscles for their security. Of these the shoulder joint is typical.

Look at the surfaces which make contact. On the one hand there is the flat or very slightly concave glenoid cavity of the scapula, deepened to a slight extent it is true by the glenoid ligament, but still relatively a flat surface. On the other hand we have the globular head of the humerus, of which not more than a small portion can make contact with the glenoid cavity at any one time. The ligaments around this joint also contribute very little to its security. The capsule is of moderate strength but is not capable of withstanding a severe strain, such as is put upon it by a sudden stress of considerable intensity. Such resistance to dislocation as the joint shows is due for the most part to the muscles that pass over the joint.

Let us consider the movements that may take place at the shoulder joint. They are extension or backward movement of the upper limb, flexion or forward movement, abduction or movement of the arm away from the body, and adduction or movement of the arm towards the body. In addition there are rotatory movements, medial and lateral, and circumduction movements in which the arm traces the outline of a cone of which the shoulder joint is the apex. None of these movements, when carried out slowly and with all the muscles on guard, will cause any inconvenience. The pectoralis major, the latissimus dorsi and the teres major, among their other actions, keep the head of the humerus pressed down on the glenoid surface while the

anterior deltoid fibres, the coraco-brachialis and the biceps, flex the joint; the posterior deltoid fibres and the teres major extend it, the middle deltoid fibres abduct and the first mentioned muscles adduct. The supraspinatus, infra-spinatus and teres minor act as lateral rotators, and the subscapularis is the chief medial rotator. The four last mentioned short muscles are of material value also in keeping the bony surfaces apposed. Note, however, the position of the insertions of these muscles. The lateral and medial rotators are attached to the greater and lesser tubercles respectively over an area situated a short distance from the proximal extremity of the bone.

Dislocation of the head might occur theoretically upwards, downwards, forwards, backwards or in an intermediate position. Dislocation upwards is prevented by the strong structures which overlie this aspect of the joint, by the coraco-acromial ligament, by the acromion process, and posteriorly by the coraco-humeral ligament. Dislocation forwards is prevented by the very powerful subscapularis tendon, by the long tendon of the biceps and by the fact that a force acting to drive the head of the humerus forward would probably either slip past the rounded shoulder eminence or set in motion the mobile scapula. In addition the anterior aspect of the capsule is specially strengthened; the thickening being known as the gleno-humeral ligaments. A backward dislocation is similarly resisted by the united force of the three lateral rotators.

The one aspect of the shoulder joint that is a source of weakness is the inferior aspect. Here the capsule is comparatively weak and the only muscular support is derived from the long head of the triceps, a muscular factor which from its alignment and its contour is not a very potent one. Dislocations, we may take it, practically always occur through the inferior part of the capsule, and they always involve a tear of the capsule.

A further consideration is to be found in the position occupied by the scapula. This is not—as is often supposed—in the coronal plane, but at an angle of about 45 degrees to it. The glenoid cavity thus looks forward as much as outward. This direction tends to render a backward dislocation more difficult. In these three directions—upwards, forwards, backwards, dislocation is almost unknown.

Now what is the mechanism of dislocation? This accident always occurs when the arm is outstretched, combining some degree of flexion or extension with abduction. There is always some degree of abduction. In other words, the deltoid muscle is always active when a dislocation occurs. We may go further and say that from the point of view of the stability of the joint, the deltoid is a dangerous muscle. Without an active deltoid, dislocation is not very likely to occur. Cases of dislocation have happened where the head of the humerus was pulled from its bony socket, *e.g.*, by the sudden starting of a vehicle of which the patient had hold. These, however, are comparatively rare. The classical aetiology is a fall on the outstretched hand or elbow.

Next let us consider the way in which a stress is applied to produce a dislocation. As a typical example we may consider a dislocation resulting from a fall on the outstretched hand. The fixed point in the system is the region of insertion of the subscapularis and the lateral rotators. The short arm of the lever is the axial distance from that insertion to the point of contact of head of humerus and capsule. The long arm of the lever is the axial distance from the point of insertion of these muscles to the point of application of the force upon the outstretched hand.

The moment of the force acting on the system is the force with which the outstretched

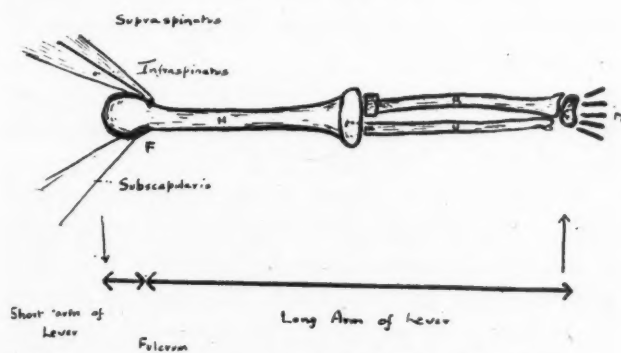


FIG. 1—The leverage responsible for the Primary Dislocation

hand meets the ground multiplied by the length of the long arm of the lever, (presumed rigid), and is equal to the moment produced by multiplying the force with which the head of the humerus bears on the capsule by the length of the short arm of the lever. The most cursory consideration must convince us that the force with which the head bears upon the capsule is just as many times greater than the force with which the hand strikes the ground as the length of the long arm of the lever exceeds that of the short arm. The result is that the capsule *per se* is inadequate to meet the strain, and gives way. The action of the deltoid still further aids the dislocating force, as outlined in the accompanying diagram.

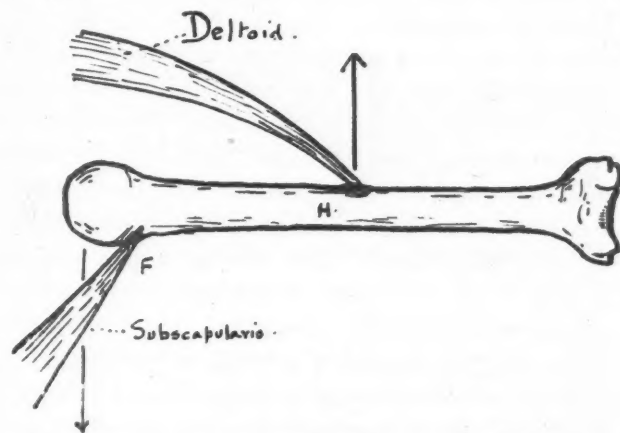


FIG. 2—Action of the Deltoid in Promoting Dislocation

In certain cases it may be that the deltoid itself, without the application of any force to the extremity of the lever, can bring about a dislocation. This is probably not the usual mechanism of the primary dislocation.

It is sometimes said that the coraco-acromial arch forms a species of fulcrum over which the dislocating force acts. It may be pointed out that the scapula is so mobile that this explanation of the accident, tempting as it may seem, is probably never correct.

The rent in the capsule is or is not repaired. If it be not repaired then "*facilis est descensus Avernii*". If it be repaired the repair can occur only by the formation of scar tissue. In place of the beautifully interwoven fibres of the normal capsule we have a cicatrix. A strain that the normal capsule would resist with ease proves too much for scar. In other words the stress required to produce a second dislocation is much less than that which is necessary for the first. Of a truth, "*Ce n'est que le premier pas qui coûte*." One dislocation succeeds another until

the accident will follow upon the most trivial of stresses; indeed the deltoid itself, without the application of any extreme force, may produce the condition. When such a state of affairs is present we are entitled to speak of it as "Recurrent Dislocation".

Scar tissue under the most favourable conditions, forms but a poor substitute for the interlacing fabric of the normal capsule of a joint. Its resistance to a sudden severe strain is very much less and prolonged steady pressure or frequently repeated moderate pressure will stretch it to almost any degree.

The treatment of the condition may be conservative or operative. Conservative measures consist essentially in the wearing of some restraining apparatus, *e.g.*, a band around the thorax, attached by a strap to another band around the arm, the apparatus permitting of a very limited amount of abduction. It is evident that under no circumstances, with this arrangement in position, can the arm be raised above the head. A joint hobbled in this way is little better than useless. If a satisfactory operative measure can be found which adjusts the disability once for all, restoring to the joint practically unimpaired movement, it is decidedly preferable.

When one finds a multiplicity of operations to remedy a defect, one may be quite sure that all fall short of the ideal in some respect. Few conditions illustrate this more strikingly than that of recurrent dislocation of the shoulder joint. For the most part these consist of some form of capsulorrhaphy, and no doubt a considerable measure of success has attended this operation. In performing it, the deltoid muscle is incised far forward so as to interfere as little as possible with its nerve supply. The capsule or the joint is then incised and a flap is folded in a "double breasted coat" manner so as to produce a two-fold thickness over the anterior aspect of the joint.

All such operations are open to the criticism that the weak part of the capsule is the inferior aspect, and unless added support is given here the measure adopted may prove inadequate.

Young, in the *Journal of the American Orthopaedic Association*, October, 1913, recommends division of the lower part of the tendon of the pectoralis major muscle, and also that of the latissimus dorsi. The reason for this proceeding is not at all clear from his paper. Only very rarely can these muscles be to blame for a dislocation by reason of their over-action.

Rich thinks that rupture of the supra-spinatus, sub-scapularis and teres major usually occurs, and points out that epileptics seem to have a special disposition towards this accident. The latter observation is no doubt a correct one. One would expect that in a joint, of which the main strength lies in muscular support, accidents affecting it, when that muscular support was not consciously applied, would result in dislocation. For treatment he recommended the insertion of "a double band of silk ligament between scapula and humerus" these being secured in position by drilling the humerus and the axillary border of the scapula. This operation, however, does not seem to have found much favour. At the best it must involve a certain limitation of movement at the shoulder joint itself.

It should be recognized that the deltoid muscle, and especially the middle fibres of that muscle, constitute a source of danger, if they are set in action without other muscles co-ordinating their action to maintain the stability of the shoulder joint. If some measure could be adopted whereby as soon as the deltoid goes into action an automatic guard is supplied to the under aspect of the joint capsule, this automatic guard not interfering with the free movements of the joint at other times, a much better solution of the problem would be attained than by limitation of the range of movement. Such an automatic arrangement is provided by the Clairmont-Erich operation, in which a portion of the deltoid itself is employed as a muscular guard. The deltoid is "hoist with its own petard". The principle is the detachment of a portion from the posterior border of the deltoid muscle, and its insinuation through the quadrilateral space to an attachment at the coracoid process. The nerve supply of the segment of the deltoid is retained intact so that on the assumption of the danger position by means of the deltoid fibres, a muscular sling gives active support to the threatened aspect of the capsule.

As the details of the operation are not generally known, it may not be out of place to recapitulate them briefly.

The patient is placed lying upon the sound side so that ready access is gained to both front and back of the shoulder without the necessity of disturbing his position. The arm is draped separately as it requires to be moved during the operation. An incision is made from the coracoid process along the anterior border of the deltoid

to a point below the insertion of that muscle. The cephalic vein is identified and retracted to the outer side. The delto-pectoral groove is opened up and the pectoralis major is detached from its insertion. This brings into view the two heads of the biceps muscle, and dissection is carried out between these. The glistening tendon of the latissimus dorsi soon comes into view lying upon the muscular fibres of the teres major. The upper border of the latissimus corresponds with the lower boundary of the quadrilateral space so the axillary nerve is in no danger. The tendon of the latissimus dorsi is almost severed, or indeed completely so, from its bony mooring and a similar fate is bestowed on the teres major. The object of this proceeding is to make sure that the quadrilateral space is fully opened up from the front. When this is done the finger is passed into the quadrilateral space, dilating it somewhat.

Clips are then applied to the anterior wound and the posterior aspect of the shoulder is next approached. A long incision is made just over the posterior border of the deltoid, extending from the spine of the scapula to below the deltoid insertion. The skin and superficial fascia are dissected from off the posterior part of this muscle and the insertion is laid bare to its very lowest limits. Commencing below and making sure to include some of the fibrous insertion of the muscle into the humerus, a strip about three-fourths of an inch in width is dissected from the posterior border. As this is traced carefully the nerve supply coming from the axillary will be found entering it, accompanied by blood vessels. This nerve supply must be carefully preserved or the operation will have failed in its main object. It is not necessary to dissect the deltoid strip as high as the scapular spine.

The finger is then passed from the anterior wound through the enlarged quadrilateral space, emerging posteriorly. A long pair of forceps is then passed through this opening, and the extremity of the deltoid flap is grasped and pulled through the quadrilateral space from behind forwards. Provided the space has been sufficiently enlarged this manœuvre presents no difficulty. If a sufficient length of deltoid has been detached, the tip of the flap reaches easily to the coracoid process where it is firmly anchored to the peristeum with silk. The sides of the flap near the tip can be attached to neighbouring structures for greater security.

It only remains to reunite the severed pec-

toralis major to its insertion. The latissimus dorsi and teres major may be left to take care of themselves. Union occurs through the medium of a small amount of scar tissue. The superficial wounds are then sutured. No drainage is necessary.

The arm is bound to the side for ten days, after which the sutures are removed. Thereafter for another ten days a sling is employed. At the expiry of three weeks the sling is withdrawn and perfect freedom permitted. Full movement is usually attained in another ten days or so.

Jones reported two cases dealt with by this method. The first was a failure, the second a success. In his opinion the causes of failure were as follows:

1. Too short a deltoid flap.
2. Insufficient enlargement of the quadrilateral space to allow of easy manipulation.
3. Insufficient fixation of the flap to prevent it returning to its original place.

Personal experience of this operation now amounts to seven cases, not one of which, curiously enough, is an epileptic. The results of the operation are so far uniformly favourable. The earliest was done in January, 1918, so that considerably over two years have elapsed since interference, without the slightest indication of return of the disability. During this time the patient has been doing much heavy work so that the joint has emerged successfully from considerable and frequently sudden strains.

The clinical histories are summarized below:

1. Gnr. W., age nineteen. Complained of recurrent dislocation of the right shoulder. He does not know how often it has occurred altogether, but the joint was "out" on five occasions during the month of November, 1917. On January 11th, 1918, a deltoid flap was transplanted. No recurrence. It was reported to me in April, 1920, that he had dislocated the shoulder again by falling on the icy sidewalk. I sent for him at once and having convinced myself that the history was not that of a dislocation I had him put his hands straight above his head, and photographed him in this attitude. The photograph is shown herewith and is I think fair evidence that the accident he sustained was not a recurrence.

2. Pte. P., age thirty-four. Former occupation, bartender. This patient came in holding his arm to his side. He does not know how

often the right shoulder has been dislocated, but the slightest unguarded movement will result in the accident. On the 10th, December, 1918, a deltoid flap was transplanted. Unfortunately this patient developed influenza, with pneumonia as a complication, and his wounds suppurated for about ten days. After that healing was complete. Practically all the suppuration occurred at the lower end of the wounds. No recurrence.

3. Mr. L. D. M., age thirty-one, grocer. Recurrent dislocation of right shoulder joint since he was eight years old. He thinks it has occurred in all about a dozen times. The last occasion was in February, 1919, as the result of a slip on the sidewalk. He threw up his hand and the shoulder went out of joint. On March 10th, 1919, a flap was transplanted from the posterior border of the deltoid. Healing occurred at once. No recurrence.

4. Pte. T. F. S., age twenty-six. Was sent by the Board of Pension Commissioners. Dislocation of the right shoulder joint occurred first in 1915 while he was doing physical training. In all the shoulder joint has been "out" six times. On May 10th, 1919, a flap was transplanted from the posterior border of the deltoid. He was last seen on July 7th, 1919, when movements of the shoulder joint were unimpaired. No recurrence to date.

5. Mr. P. S., age forty-two, junk-dealer. Dislocation of the left shoulder joint has occurred in all about twenty times. Comparatively little force is needed to bring this about. On May 14th, 1919, transplantation of a deltoid flap was performed. Healing occurred without incident. No recurrence.

6. Pte. B., age twenty-seven. Recurrent dislocation of the right shoulder. States it has been out "fifty times." The last dislocation occurred while he was turning over in bed. On July 30th, 1919, transplantation of deltoid flap was performed. The extreme muscularity of this patient was the only source of difficulty. No recurrence to date.

7. Mrs. J., age forty-four. On December 20th, 1919, while she was reaching for some article on a high shelf of a cupboard, her foot slipped, she over-balanced, and pulled the cupboard over on top of her. When seen the left shoulder joint was extremely moveable, dislocation being apparently producible by the slightest movement. X-ray negative. I decided to treat the case as for recurrent dislocation. At operation, Febru-

ary 15th, 1920, the long tendon of the biceps was found to be ruptured, a complication probably occurring much more frequently than one imagines. Transplantation of a posterior deltoid flap was performed and the wound healed without incident. She is already doing all her own housework. A somewhat interesting concomitant of the operation, in this particular case, is its psychic effect. Considerable mental depression, probably associated with the onset of the climacteric, had existed, and was largely focussed in the painful and useless shoulder joint. Since her operation the improvement in the mental condition is considerable.

Some cases of habitual dislocation are better left alone, as *e.g.*, when the dislocation enables the patient to perform movements that would otherwise be impossible. An example of this is afforded by the case of E. P., age thirteen. At the age of two she suffered from an attack of poliomyelitis which affected both lower limbs and both upper limbs. Among other muscles the deltoid on both sides suffered severely, as did the external rotator muscles of the shoulder. In spite of this she is able to raise either arm above the head, although she is unable to perform this movement with both upper limbs simultaneously. The movement is accomplished by first of all producing a voluntary subcoracoid dislocation of the humerus. In all probability the long tendon of the biceps acts in this position as a species of suspensory ligament. The pectoralis major and the teres major can then act upon the limb elevating it to a slight extent. By a sudden jerk the arm is thrown upward and retained in the upright position by the action mainly of pectoralis major and teres major, assisted by a few of the posterior fibres of the deltoid, on the left side particularly. This is a case which really deserves the epithet of "habitual dislocation", and is a very instructive example of how a muscular defect can be compensated by the use of other muscles.

Some of the cases dealt with by this operation have not yet undergone sufficient test to enable one to pronounce with certainty on the value of this operation in the treatment of recurrent dislocation of the shoulder. Since this paper was completed there has been reported a series of four cases by Ollerenshaw to the British Orthopaedic Association. In his paper a very cheerful view was taken of the matter; one's own experience to date encourages one to share it. Indeed, when a case of this disability is en-

countered, the remedy is prescribed with more confidence than in the case of many procedures of older standing and higher reputation. The principle of the operation is undoubtedly correct,

and its application requires no more than the ordinary degree of surgical skill, combined with some confidence in recognizing anatomical landmarks.

NOTES ON EPILEPSY

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A REVIEW of recent literature published under the title of epilepsy contains matters of practical and theoretical interest, although it cannot be claimed that much advance has been made towards clearing up the obscurity in which the real nature and origin of this mysterious affliction still remains.

A subconscious wish to flee from reality and return to prenatal conditions, by losing self-consciousness and making movements apparently purposeless, or at any rate not directed by higher psychic levels, is offered as an explanation of the phenomena of epilepsy by Pierce Clarke; and along this line of thought we find an article giving an account of Head's discussion of psychic levels and control, in which he says that in view of recent researches our views of epilepsy need drastic revision. He describes the whole nervous and mental mechanism as a structure built up as a series of functional levels, each of which guides and controls the level below it. For instance, in certain lesions in which control is cut off there is dorsi-flexion of the toe and loss of bladder control, the disturbance reaching comparatively low levels, as in many epileptic seizures; whereas, in hysterical fits, only higher levels are involved and these phenomena do not occur. Admitting that the emotions, acting as part of various instinctive forces, are the driving forces of co-ordinated activities, but acting unchecked result in inefficient utilization of energy, and that below the developed emotional level there are various less co-ordinated mental activities which psychotherapy in its investigation of the unconscious is gradually bringing to light, an attractive hypothesis presents itself, namely that unconscious forces, as yet little understood, through disturbance of the higher

emotional levels and cutting off of psychic control, produce outbursts of non-regulated motor activity. Head believes that many fits labelled epileptic are hysterical, especially in those cases in which epileptic fits have appeared during childhood and continued for several years, and then after a quiescent period lasting a number of years, convulsions have reappeared. In hysterical fits suggestion, acting through the subconscious mind, will tend to modify the neurone paths through which the motor activity finds expression.

Many organic conditions of the brain have been found in association with convulsive fits, such as gliosis of the cortex, dilatation of the ventricles, adherent membranes, and much emphasis has been placed upon heredity, toxic conditions, notably alcohol and lead, and the effects of infectious diseases; but, as yet, no satisfactory explanation is forthcoming as to why or how convulsive seizures appear in certain individuals and do not appear in others with similar brain lesions, or exposed to the same toxic or infectious influences. Nor has it been proven, once we admit that every convulsion is followed by damage to the brain tissues, that gliosis, for instance, may not be the result rather than the cause of convulsions.

The peculiar mental and emotional make up of the epileptic, his supersensitiveness, irritability, impatience of being inferior to the average in any respect, unless so much deteriorated that his insight is lessened or lost, his tendency to introspection; all these factors are outward and visible signs of emotional instability which it is easy to picture as running over sometimes in waves of uncontrolled action, just as an ordinary man when very angry may lose control,

clench his fists and stamp and swear. And the epileptic when angry may have a peculiar seizure in which he does not lose consciousness but works his face and limbs spasmodically, and we are apt to call this hysterical. And so the line between hysteria and epilepsy tends to become blurred once we fall into line with Head's conception of functional levels, for according to this conception the difference is principally a matter of degree, or rather of height of level. Besides, if suggestion working on the unconscious mind can alter certain neurone paths in the one condition, one asks, why not in the other?

We are naturally attracted towards the hypothesis containing the elements of hope and promise of better things, of more rational and effective treatment. A more hopeless or depressing task than handing out bromides, week after week, to a number of epileptics and watching them deteriorate is hard to imagine. Besides, an appeal to our sense of the mysterious is always attractive, and the subconscious or unconscious mind is still a comparatively undiscovered country.

And the presence of organic changes in many cases of epilepsy is not necessarily opposed to this theory, for the latter is based on functional disturbance, and it is quite conceivable that this may exist as a result of or coincidently with organic changes.

No matter whether we are inclined to agree with Freud in his theory of repression and fixation of infantile sexual (in the largest sense) tendencies, or with Jung in his idea of "laziness", or with Adler in his "organ inferiority" idea, as the basis of psychoneuroses, it is certain that the researches of these men and their followers have modified profoundly our views as to the nature of the psychoneuroses and psychoses through the study of the unconscious and its influence on our conscious life. Is it not reasonable then to apply the same method of investigation to cases of convulsive phenomena in which no toxic or organic causes can be demonstrated but in which psychic disturbances, peculiarities of disposition and tendency to mental deterioration are common?

One stops to think when one young man, an epileptic, with mental and moral regression, volunteers the statement that he dreams nearly every night and that frequently he knows a fit is coming on because he becomes aware of the same dream thoughts going through his mind. Is it far fetched or too fanciful to consider a possible re-

lation between his subconscious mind and his attacks?

The process of psychoanalysis is a time consuming affair, but in selected cases might be productive of good results if subconscious conflicts could be thereby eliminated. But even stopping short of such deep investigation, a thorough study of the personality of each patient as far as his conduct and conscious mind are concerned should be made. Mental twists and peculiarities can be straightened out to some extent and habits of life improved.

It is taken for granted also that every patient is examined from every standpoint, namely organic disease, endocrine disturbance, Wassermann reaction, measurement of intelligence, and neurological and psychiatric examination; in short, not to be content to make a diagnosis of epilepsy, write it on the card, and prescribe bromides or luminal. This latter is not progress; it means regress for the patient.

But for many years it has been known empirically, without any delving into the unconscious mind as the possible origin of ill-regulated activities, that regular work is a good thing for epileptics. The Craig Colony report of the marked reduction in the average daily dose of bromide per day per patient, as the system of regulated work has become perfect, is a striking testimony of the efficacy of work.

In March, 1920, the writer was permitted to take charge of the cases of epileptics attending the Royal Victoria Hospital for special study. It happened fortunately at this time that we were able to get a supply of luminal, and there was opportunity to compare with results of luminal with the recorded result of bromides in these patients. The most notable change was the disappearance of mental depression. In most of the cases the average number of attacks diminished, while in others little difference was noted. Some patients react remarkably well to luminal. For instance, one boy aged nineteen, who had been having attacks for several years, has not had an attack for fourteen weeks, a record unknown in his case under bromide. A girl, aged twenty-five, who formerly had such severe depression that she had no interest in life and had meditated suicide, has become quite cheered up. We cannot multiply instances, as space forbids. But we are certain that as long as the supply of luminal holds out we are not going back to bromides. No toxic results have appeared, excepting mild drowsiness at first in one or two

cases, which promptly disappeared on omitting the drug for a day or two, and in one instance a condition resembling alcoholic intoxication in a young man who had been taking two grains three times a day for a few days. Also, one patient developed a rash resembling measles on the arms and trunk. We are certainly in accord with Dercum, Grinker and others, that luminal is superior to bromides as a sedative in epilepsy. It remains to be seen whether it has any curative properties, but it has been found in some instances that, after discontinuing the use of the drug, the attacks have returned with their former severity.

The necessity therefore for providing occupation for these patients became apparent, and so came into existence the organization now incorporated as "The Montreal Industrial Institute for Epileptics". A class was started under the auspices of the National Committee for Mental Hygiene, but financially independent, in May last, with four pupils under the instruction of Miss Nagle, formerly military aide, and has continued. The number of pupils has increased to twelve, the additional pupils coming from the Royal Victoria and General Hospitals. Instruction is given in basketry, weaving, book-

binding, chair-caning and other trades. There is no question in the writer's mind that the work, the instruction, the cheerful atmosphere of the class, the friendly rivalry, and the prospect and realization of earning money have effected a marked improvement in the mental status of the pupils, generally speaking, although it is impossible to estimate whether it has actually helped in reducing the number and severity of their attacks. It is beyond question that the pupils have now an attitude of hope and cheerfulness which was lacking before. They are now useful and productive members of society, even though to a limited extent, and there is a prospect of their efficiency and earning power increasing. It is the object of the association to teach occupations which the pupils may continue at their homes after they have left the class, so that they may become self-supporting.

It has been found that on practical grounds epileptics markedly deteriorated, mentally or morally, are not suitable for the class, nor those subject to frequent attacks before these have been fairly well controlled by sedatives.

The attention of the medical profession is called to the existence of this Industrial Class, and their sympathy and support are solicited.

Dirty Money—It is too bad that the great bulk of the paper money at present in circulation is so dirty. We often hear money spoken of as filthy lucre. There is a particular significance to the term to-day, for it is impossible to imagine our paper currency with a filthier or more soiled aspect. It is to be hoped that conditions may soon make it possible for the Treasury Department to call in the dirty money that the people have been forced to use, and either give it a good bath or else issue "something just as good" in its place. This does not mean we countenance substitution, but we are willing to make an exception in the exigencies of the situation. The bath we suggest, moreover, should not be an "immunity bath", for we do not want the cleansing process to absolve even the humblest dollar bill, this coming year, from any of its obligations or responsibilities under the law.

To speak in a more serious strain, there is real danger from paper money as dirty as that which

we have been using. Not only do the roughened, minutely frayed surfaces of worn and soiled bills favour the collection of germs, but these, with grime and dirt, work their way into the tiny seams and almost microscopic cracks. Passed, as they are, from person to person, many of whom know next to nothing of cleanliness, it takes no very vivid imagination to envision innumerable ways whereby money may be germ contaminated. Money then becomes a germ carrier, with all the potential dangers of a transmitter of infective material. The subject might be elaborated in greater detail, but enough has been said to emphasize the conditions that exist. The appearance of quite a little new paper money around Christmas time leads to the hope that the filthy lucre we have been using will soon disappear. If only for appearance sake, we would welcome this prospect, but when we think of the hygienic benefits, the possibility becomes doubtfully pleasing.—*American Medicine*, December, 1920.

A PLEA FOR THE MORE GENERAL USE OF LOCAL ANÆSTHESIA

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EVER since Richardson in 1866 demonstrated the possibility of anæsthetizing the skin by means of ether spray, the subject of local anæsthesia has received considerable attention, but nothing of any great importance was accomplished until the introduction of cocaine by Koller¹, of Vienna, at the Heidelberg Ophthalmological Congress in 1884. For centuries the South American Indians have recognized the invigorating qualities of coca leaves when chewed and this fairly general habit was responsible for the discovery of the most valuable medicinal property of the plant because numbness of the tongue from local contact with the drug is quite as apparent as is the constitutional effect.

Naturally topical application was tried first and the new drug soon established itself in the field of ophthalmology as well as of rhinology and laryngology in rapid succession. That cocaine has been of great service in the above mentioned specialties is well vouched for by the prevalence of its use at the present time, but the drug has no such record when injected into the tissues, and the dangers in connection with this method were recognized early so that diligent search for a safer local anæsthetic has occupied the attention of medical science even up to the present day. The first solutions of cocaine were used much too strong and the success which has attended the use of the various combinations of drugs for local anæsthesia has well borne out this fact. Schleich's solutions, which used to be so popular, contained as little as 0.01 per cent. of cocaine combined with morphia and sodium chloride. That the morphia was of much assistance constitutionally we are quite ready to admit, but we have long since known that the local action is entirely due to the cocaine, assisted by the pressure created in the tissues by the large volume of salt solution.

In the effort to get away from the toxicity of cocaine, Braun, Reclus, and Legrand introduced eucaine, and Custer brought tropacocaine to the attention of the profession, but both were found to be much less potent and more evanescent than cocaine. Stovaine, alpin, holocaine, aposthesine and various other drugs have been introduced and all have their merits, but it seems to me that more nearly the ideal has been reached

in novocain than in any of its predecessors. Braun's² demands for a local anæsthetic are as follows: That the drug should be less toxic than cocaine proportionately to its local anæsthetizing power; that it should not cause any damage to the tissues; that it should be soluble in water and easy to sterilize when in solution and finally that it should be capable of being combined with some adrenal preparation. Novocain measures up to all these standards and is now manufactured in the United States by several firms and marketed under the name procain.* It was discovered by Einhorn in 1905 and is a synthetic chemical, readily soluble in water and may be heated to 120° C. without decomposition. Aqueous solutions are decomposed by alkalies—a point of practical importance in the sterilization of syringes and containers as even a trace of alkali will precipitate the anæsthetic solution and destroy its potency.

Dosage. In so far as I have been able to ascertain, novocain is practically nontoxic and I have frequently used 100 c.c. of half per cent. solution without the slightest inconvenience to the patient while I recall one case where 200 c.c. was used in the excision of a pilonidal cyst. The drug seems to be so free from toxicity that large quantities of weak solutions may be used with impunity and this factor is of great assistance in producing real anæsthesia over a sufficiently large field to facilitate a complete operation without causing the patient any pain.

Strength of solution. For ordinary use in loose tissues half per cent. solution, as recommended by Braun, will give perfect anæsthesia and the weak solution is an advantage because of the additional volume of liquid at one's disposal. For bone work a one per cent. solution is better because the quantity of liquid which may be injected beneath the periosteum is quite limited. Stronger solutions up to four per cent. are frequently useful for blocking particular nerve areas such as in surgery of the mouth and maxillæ while still stronger solutions are in popular use for topical application to mucous membranes. It is especially valuable in urethral work because of the well-known danger of cocaine in this region.

*Manufactured and marketed in Canada under the name of ANOCAIN.

Addition of adrenalin. This addition serves two very useful purposes. In the first place the length of anæsthesia may be prolonged by the judicious use of the adrenal product and secondly, the hæmostatic effect is of great assistance during the operative procedure. In this connection it is well to remember that the danger of post-operative hæmatoma is much in evidence and more perfect hæmostasis is necessary than when operating under a general anæsthetic. A strength of 1-200,000 is generally useful but in very vascular areas or when prolonged anæsthesia is required, the strength may be increased to advantage even up to 1-40,000. In plastic work when the vitality of sliding flaps enters into the consideration, it is well to work with as weak an adrenalin content as possible. Especially is this a fact if the pedicle of the flap is either very long or very narrow as one may quite readily destroy the flap by shutting off the circulation with too much adrenalin. The combination of an adrenal product with the anæsthetic has been one of the greatest factors in bringing local anæsthesia up to its present state of perfection because absorption is retarded directly according to the quantity of hæmostatic employed thus allowing the nerves to remain bathed in novocain.

Preparation of patient. In operations under local anæsthesia the psychic element plays a very important part and we might well state the fact here that all patients are not good subjects for this method, although much depends upon the personality of the surgeon and his ability to "handle" the patient. A mild hypnotic such as sulphonal or veronal on the preceding night is good practice to insure sleep and a hypodermic of morphia should be given half an hour before operation. Hyoscine is frequently combined with the morphia but the drug is in my estimation too dangerous for general use, and I have seldom seen the necessity for such a combination. A good tactful nurse does well as a psychic anæsthetist to keep the patient engaged in conversation and otherwise detract his attention from the work in hand. Organization in the operating room should be so perfect that talking on the part of either the surgeon or his assistants is reduced to a minimum. A reference to bleeding or the mention of instruments which ordinarily cause pain may quite easily disturb the patient's equilibrium and suggest painful sensations when the manipulations in progress are really not causing him any actual distress.

Technique. One of the most important steps is the provision of a very liberal anæsthetic field for the operation and failure to do this very thing accounts for many of the cases that we have all seen where the operation has been performed under great difficulty and with much anguish to the patient. By the use of a

long fine needle it is very easy to infiltrate a large area and the only pain to the patient should be the initial puncture. Working subcutaneously and depositing solution all the while it is quite possible to draw loose tissues, such as the abdominal wall, towards the point of the needle so that one commands an area of tissue nearly twice the length of the instrument. In this manner a large oblong tract should be blocked off so that retraction of flaps or dissection in the tissues at a reasonable distance from the incision may be possible without causing pain. My regular practice is to wait for five minutes before making the skin incision, thus allowing the anæsthetic sufficient time to permeate into the nerve endings. The deeper tissues are injected in much the same manner but it is not necessary to go quite so far afield from the incision as in the case of the subcutaneous injection. It is well to inject the deeper tissues along the line of the proposed skin incision and then complete the deep anæsthesia under direct vision, after going through the skin. In abdominal work a third injection must be made into the peritoneal tissue before cutting into this membrane as the parts in this region are extremely sensitive. If the operation entails work on bones an injection beneath the periosteum is necessary. Endoneural injection, as originally practised by Crile, is quite unnecessary and the recognition of this fact has assisted much in the development of regional or conductive anæsthesia. Plenty of anæsthetic in the immediate vicinity of the nerve supplying the part and sufficient time allowed for permeation will produce the desired result quite as effectually as the more delicate and difficult method of injecting the nerve directly. Thus the exposure of the nerve in question is rendered unnecessary and we may depend upon the usual anatomical landmarks and bony prominences to direct the needle into the immediate vicinity of the nerve.

The operation. It is quite possible to anæsthetize tissues against the necessary surgical insults, such as cutting, careful blunt dissection and suturing, but the rough use of retractors or otherwise pulling upon tissues or organs will always cause pain. Everything must be handled with the utmost care and gentleness and since the patient is not being subjected to the risks of a general anæsthetic, his interests are best considered when we take plenty of time to do the work well without causing him pain. All instruments should be in first class condition and everything of the cumbersome order eliminated. Picking up a bleeding point with a large hæmostat may cause intense pain whereas the same procedure with a neat slender pointed instrument would take care of the bleeder without involving a mass of the surrounding tissue with its bundles of small nerves. In abdominal work an accurate diagnosis,

a liberal incision and a good working knowledge of anatomy are the prime requisites and given these together with a careful painstaking surgeon, there are few operations in this region that cannot be done under local anaesthesia. The abdominal viscera are quite insensitive except when traction is made upon the mesentery. Anything but very careful handling of the stomach and intestines will produce nausea so that exploration is much limited and this is one of the greatest disadvantages of the method for abdominal surgery. Even if our diagnosis is correct and we find a chronic appendix, it may mean much to the patient to ascertain the condition of his gall bladder and the possible presence of stones. Such a procedure under local would surely cause the patient considerable pain.

Field of application. If we include under the heading local anaesthesia, conductive anaesthesia, then there are few surgical operations in properly selected patients that cannot be accomplished in this manner. As early as 1891 Schleich reported two hundred and twenty-four operations performed under very dilute solutions of cocaine, the list including many laparotomies and Cushing³ in 1900 reported forty-nine herniotomies out of a total of two hundred and thirty-three such operations performed within a two-year

period at Johns Hopkins. The above two series taken at random from quite voluminous literature on the subject would indicate that even with cocaine, the method was popular and that a successful technique had been developed, but the dangers of the anaesthetic together with the additional toll taken out of the surgeon by way of inroads on his time and the difficulties of dealing with a conscious patient have had the effect of making local anaesthesia less popular. There have been good reasons for the lack of enthusiasm on the subject among surgeons but it would seem that the objections have been pretty well overridden, and I firmly believe that the interests of our patients would be better served by a more general use of the method. Patients are daily being subjected to the risks and disagreeable after-effects of a general anaesthetic for operations on hæmorrhoids, hernia, radical hydrocele and the excision of neoplasms who might just as readily be operated upon under local anaesthesia by the expenditure of a little more time and patience on the part of the surgeon.

References:

1. HIRSCHL.—"Text-book of Local Anaesthesia."
2. BRAUN.—"Local Anaesthesia."
3. CUSHING—*Annals of Surgery*, vol. xxxi, 1900.

POST-GRADUATE LECTURE-DEMONSTRATIONS

QUEEN'S UNIVERSITY—FACULTY OF MEDICINE

It is proposed to hold throughout the Session a series of monthly lecture-demonstrations dealing with the scientific aspect of matters which are of practical interest to the medical man. These lectures will be held in the New Medical Building, on Mondays from 5 to 6 o'clock. The following is the series proposed for the current Session. A continuance of the lectures will depend to a certain extent upon the interest shown. The lectures will be illustrated by lantern slides, microscopic demonstrations and experiments. All medical men are cordially invited.

1. *The Pneumococcus*, its relationship to other bacteria, its types and the importance of these in the serum therapy of pneumonia. Lecturer—Professor James Miller. January 24th.

2. *Influenza*, its bacteriology, relationship of Pfeiffer's bacillus to the disease, prophylactic vaccination. February 21st.
3. *The Ductless Glands and Organo-therapy with experiments.* Lecturer—Professor G. Spencer Melvin. March 21st.
4. *The present position of the Cancer Problem.* Lecturer—Professor James Miller. April 18th.
5. *Typhoid and Paratyphoid Fevers*, Bacteriology, serum diagnosis and vaccine prophylaxis. Lecturer—Professor James Miller. May 16th.

J. C. CONNELL, Dean.

Note.—A branch telephone is in course of installation in a room adjoining the lecture theatre.

NOTE ON SEASONAL HAY FEVER

W. NESS, M.D.

IT is now an established fact that seasonal hay fever, as the term is generally understood by the medical profession, has for its cause a protein to which the individual is sensitive.

For this newly developed knowledge, we are chiefly indebted to the untiring efforts and delicate findings of L. Chandler Walker, and his associates, Wodehouse and Adkinson. As a result of their investigations over five years, we are now able not only to find out the specific cause in nearly every case of seasonal hay fever, but we can satisfactorily prevent the condition, provided the proper treatment is administered, and at the proper time.

It is a fact that a very small percentage of seasonal hay fever cases are of bacterial origin, and, therefore, not due to protein sensitization; occasionally, however, a few of the bacterial cases may be sensitive to the protein in the bacteria.

Seasons and Causes. Since the term hay fever and its synonyms, as commonly used, are misleading and inaccurate, it is well to understand both the seasons and the causes of the different varieties.

During April and May, throughout the East, the various trees pollinate, namely, elm, maple, willow, walnut, oak, birch, as well as the dandelion, and only recently has it been demonstrated that tree pollen may cause seasonal hay fever.

The next season begins late in May and extends to the early part of July, during which time pollination occurs among the various grasses, including timothy, orchard-grass, red-top, daisy and June grass, and it is their pollens that cause seasonal hay fever at this time.

The third season begins about August 15th, and lasts until the frost. During this period the composite family of plants pollinate, namely, ragweed, golden rod, sunflower, daisy and corn, and give rise to the seasonal hay fever at this time.

Stated briefly, then, we have tree pollen hay fever,—later on grass, or hay pollen, hay fever,—and later still pollen hay fever from the compositæ family of plants.

The history, then, indicates the season, and by the skin test we can determine positively what particular pollen induce the symptoms.

Symptomatology. The symptoms of all three seasonal types are the same, i.e., there is a catarrh of the

ocular conjunctivæ, and of the nasal and pharyngeal mucous membranes, beginning with a tickling and burning sensation, followed by marked sneezing, watering and itching of the eyes, running and itching of the nose. Associated with the attacks there may be marked depression and headache, and even general malaise. During the attack the mucous membrane of the nose and pharynx is highly irritable, so that dust, train smoke, strong odours and the like, aggravate the symptoms, whereas out of season the mucous membranes remain unaffected.

The duration of the attacks varies with the cause, and depends upon the pollination period. In the majority of cases the late type is found, i.e., from mid August until the frost.

Pollen Protein Sensitization. Sensitization may be either pre-natal or post-natal, and just why some individuals are sensitive, and some are not, is hitherto unexplained. Thus much we do know, however, that nearly every individual having seasonal hay fever, is sensitive to the protein in the pollen of some plant.

Multiple sensitization in seasonal hay fever is rather uncommon. Nevertheless, a small percentage of pollen hay fever patients are sensitive to two different botanical families, and consequently have hay fever throughout two distinct pollen seasons.

The age of onset of seasonal hay fever and its duration have no bearing upon the frequency, cause or treatment of the condition.

In Walker's series of 300 cases, or Cook's of over 600 cases, it was established that neither sex, occupation, or nationality seem to influence the cause, prevalence, or treatment.

Treatment. Other than specific protein treatment, there is none worth attempting, and by specific protein treatment, I mean desensitization against the particular protein causing the symptoms.

It is essential to successful treatment to find out just how sensitive the patient is. This is done by using various dilutions of the protein in conjunction with the skin test, then treating by injections with a dilution weaker than that to which the patient reacted to the skin test.

Positively. The skin test selects the proper pollen, and determines the degree of sensitivity, and thereby

the proper strength solutions with which to start treatment.

Negatively. The skin test excludes those pollens to which the patient is not positive, and thus makes possible the avoidance of "mixed extracts" in treatment.

The ideal treatment in *seasonal hay fever* cases is pre-seasonal, for the same obvious reason that it is useless to vaccinate one against smallpox who already has smallpox; so, too, with respects to typhoid fever. Not so, however, in the case of diphtheria,—so when we say that the ideal treatment is pre-seasonal, there is still room for the statement that if a seasonal hay fever case presents himself during the season, he ought to be treated, but with the utmost care, and mindful of the individual idiosyncracies and requirements of the case.

Pre-Seasonal Treatment. The regular scale of dosage, as given below, is generally satisfactory. As a result of studied conclusions, the following table will be quite safe under ordinary conditions:

Solution 1-10,000		Solution 1-1,000	
1st injection.....	0.1 c.c.	7th injection.....	0.2 c.c.
2nd injection.....	0.2 c.c.	8th injection.....	0.3 c.c.
3rd injection.....	0.3 c.c.	9th injection.....	0.4 c.c.
Solution 1-5,000		Solution 1-500	
4th injection.....	0.2 c.c.	10th injection....	0.2 c.c.
5th injection.....	0.3 c.c.	11th injection....	0.3 c.c.
6th injection.....	0.4 c.c.	12th injection....	0.4 c.c.

Injections should be given not more often than every five to seven days. Treatment should be begun about twelve weeks ahead of the season, and after the above scale of dosage has been given, a few final treatments of solution 1-100 should be given.

Treatment during the season is open to question, for the obvious reason that the patient while receiving a known quantity by injection, acquires in addition an unknown quantity from nature. At all events, if the patient presents himself *during* the season, treatment, if attempted at all, must be carried out with a great deal of caution.

SUGGESTIONS TO CONTRIBUTORS

WITH a view to raising the character and value of our JOURNAL throughout Canada, and rendering it of the most service to the profession, the Editors are of the opinion that careful consideration of the following suggestions by all our contributors will avail much. We, therefore, respectfully invite the attention of all our readers to the following points:

Do not attempt to make your article assume the proportions of a book. Space precludes such in the first instance, and readers do not expect to find an exhaustive treatise of any subject in a medical journal. Furthermore, such long articles take more time than can be conveniently given by the general reader. Avoid, therefore, verbosity. Many a good subject is spoiled by being so padded and swathed in words that the points of interest are obscured.

Long sentences and paragraphs are rarely necessary. They weaken the article, and do not reflect credit upon the writer.

Keep to the subject you are discussing. Too many quotations from authorities are seldom demanded, and

are liable to confuse the reader, and take up much space. Bibliography, though worthy, is frequently overdone. The value of a paper is not estimated by a multiplicity of references, but by what you have to say, and how you say it.

Write concisely. Do not hesitate to condense as much as you can without interfering with clarity of expression.

Respect the amount of space in the JOURNAL, and the cost of the printing page. Don't send in your manuscript until it is properly completed, viz., carefully typewritten (original copy), double spaced, corrected as to English and punctuation, and ready to be placed in the hands of the printer. There is no excuse for the author who finds it necessary to make many changes in the printed proof.

Illustrations are costly. Their value is obvious, but the expense entailed makes it necessary to include only such illustrations as are vital to the value of the paper.

Make use of the Editorial Board in your own province, and send all material through it. (See page iv.)

HYPERTHYROIDISM—PRESENT STATUS OF DIAGNOSIS AND TREATMENT

E. M. EBERTS, M.D.

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OUR knowledge of those diseases of the thyroid which are associated with symptoms of hyperthyroidism has, within the last five years, been sharply revised. This has been due not so much to a more thorough understanding of the cellular pathology of the gland as to the accurate index of its functional activity afforded by the application of metabolic methods to the study of thyroid disease.

The normal thyroid is made up of acini and embryonic interstitial cells. The latter are of precisely similar origin to the cubical epithelial cells which line the acini, but represent the unused residue of the material available for the differentiation of the functioning element of the gland.

The function of the thyroid is concerned with the elaboration of a hormone essential to cell metabolism. These hormones determine the quantity of energy that any given cell in the body can produce by stimulation, from either within or without. By determining the basal metabolic rate—by which is meant the minimal heat production of an individual, measured after a fast of from twelve to eighteen hours and after the body has been at complete rest for at least twenty minutes—one can tell whether the hormone supply is above or below normal. In hyperthyroidism it is above normal.

Causes of hyperthyroidism. We have no definite knowledge of the causes of increased thyroid activity. That process of thought which invariably accepts as cause some event immediately preceding the effect regards the vagaries of the thyroid as the direct outcome of some physical or mental disturbance. It is a fact that a large number of cases of Graves' disease do develop immediately after some severe nervous shock or mental strain, and that there is often a definite history of an antecedent acute tonsillar infection, but there are many cases outside this category in which we are unable to offer even a conjecture as to the origin of the hyper-activity.

It is not definitely known whether the increase

in the mitochondria content of the cells of the acini noted by Goetsch in hyperplastic goitre, discrete nodular adenoma, and diffuse adenomatosis, indicates functional or proliferative hyperactivity.

Value of basal metabolic methods in hyperthyroidism. In hyperthyroidism, basal metabolic methods are of great value clinically in the following ways:

- (1) In determining the degree of toxicity in cases of toxic goitre.
- (2) In determining the operative risk judged by the degree of toxicity.
- (3) In determining whether in a given case of toxic goitre, especially the exophthalmic type, the individual is approaching or receding from a crisis—information of great importance where an operation is under consideration.
- (4) In determining whether, in cases of large goitre with symptoms resembling hyperthyroidism, these symptoms are due to hyperthyroidism or not.
- (5) In differentiating, in the presence of goitre, between tachycardia of nervous origin and that due to increased thyroid activity.
- (6) In discovering the effects of operation, x-ray treatment, the administration of thyroxin, or other modes of therapy.

Classification of thyroid disease associated with symptoms of hyperthyroidism. Diseases of the thyroid associated with symptoms of hyperthyroidism may be divided into two main groups: (1) those associated with hyperplasia of the embryonic interstitial rest cells; and (2) those in which the glandular acini show variations from the normal. We will first consider Group 1.

Hyperplasia of the embryonic interstitial rest cells gives rise to two conditions: (1) Discrete nodular adenoma; and (2) Diffuse adenomatosis.

Discrete nodular adenoma—toxic adenoma—results from focal proliferation of the interstitial rest cells. As the nodules grow, definite acini are formed, which, after passing through progressive stages, may come to resemble very closely those seen in exophthalmic goitre, in

which the walls are infolded and the epithelium columnar. The disease, in 50 per cent. of the cases, is bilateral. The goitre appears at an earlier age than in Graves' disease, but the age at which symptoms of hyperthyroidism develop is, on an average, ten years later, from fifteen to eighteen years elapsing between the appearance of the goitre and the development of toxic symptoms. The symptoms develop slowly and have usually been in progress two or three years before the patient seeks surgical treatment. The toxic period, therefore, generally occurs in middle life, between the ages of forty and forty-seven. The increase in the basal metabolic rates seldom exceeds plus 35. Vascular hypertension is present. Eventually all of the symptoms of Graves' disease may be well defined except exophthalmos. Even in this type, if, in addition to adenoma, areas of glandular hyperplasia are also present, the staring eye, as distinguished from the protuberant eye, is occasionally noted.

In diffuse adenomatosis—the type described by Goetsch—one has to deal with a bilateral diffuse adenomatosis, originating in the embryonic interstitial cells. In these adenomata, which are numerous and small, the acini are less perfectly developed than in the discrete nodular type. An attempt to differentiate this group has led to a great deal of controversy, which is not yet ended. The symptomatology may be outlined as follows: Moderate evening temperature, $99\frac{1}{2}$; pulse labile and accelerated; underweight, with inability to gain weight; tremour; cold hands; mental disturbances, fits of crying, etc. Goetsch states that the adrenalin test is invariably positive. The basal metabolic rate is normal. Sometimes an incipient lung lesion is also present, which may for a time be misleading, but not ultimately, for, while the lung condition and attendant symptoms may after a period of rest show distinct improvement, the fever, tachycardia, tremour and weakness recur as soon as the individual begins to take exercise again.

If we now turn to Group II, which deals with variations from the normal in the glandular acini, we will find that it also may be subdivided into two parts: (1) the hyperplasia of puberty; and (2) Graves' disease or exophthalmic goitre.

In the hyperplasia of puberty the acini, which are normally circular in outline and lined with cubical epithelium, show a slight irregularity in contour and an increase in size, and there is a tendency in the lining cells to assume the columnar type. In an individual whose thyroid shows

this type of disease, the basal metabolic rate is slightly increased.

In Graves' disease or exophthalmic goitre, the acini are enlarged and irregular in contour, and the epithelium is infolded and definitely columnar in type. The basal metabolic rate shows an average increase of plus 50, and in individual cases may be as high as plus 100. The goitre appears generally between the ages of twenty-eight and thirty-eight, and symptoms of hyperthyroidism are noted within from three to nine months after the development of the goitre. The symptoms progress rapidly. Exophthalmos is well defined, in half of the cases, within three months of the onset of symptoms. The glandular hyperplasia is bilateral in 90 per cent. of the cases. Surgical aid is sought, on an average, ten years earlier than in toxic adenoma. The individual may present all the cardinal signs and symptoms of this well-known disease, viz: palpitation, rapid pulse, exophthalmos, increased appetite, nervousness, tremour, loss of weight, loss of strength, fever, heat intolerance, vomiting, diarrhoea, and, in the later stages of the disease, myocardial changes, leading finally to auricular fibrillation and general oedema. Vascular hypertension is conspicuous by its absence.

TREATMENT OF HYPERTHYROIDISM

Medication. To use the well-known expression of the late Professor James Stewart: "There is no known remedy which has any particular effect upon the course of the disease." That is not to say, however, that in hyperthyroidism the administration of thyroid preparations may not be distinctly harmful. In this connection it is interesting to note that experimental observations are being made upon the effects of the administration of thyroxin—the active constituent of the thyroid gland, which has been isolated by Kendall. On the assumption that hyperactivity in the thyroid gland is a response to some form of systemic demand, it is thought that the administration of thyroxin may allay this demand and thus lead to a slowing down of the glandular process. The effects can be noted with almost mathematical precision by studying the basal metabolic rate. Thus, the administration of one-third mgm. of thyroxin will increase the basal metabolic rate of an individual weighing 150 pounds by one per cent. It has been shown that in a case of myxoedema with a metabolic rate of minus 30, the administration of 10 mgm.

of thyroxin will restore the basal metabolic rate to normal. The rapidity of exhaustion of thyroxin, the amount consumed daily, the glandular content and the body content, may all be established by metabolic determinations. These experiments revive memories of past methods of medication, which favoured the administration of thyroid extract and iodine products in the treatment of hyperthyroidism, with results that in some cases were said to be encouraging and even curative.

Refrigeration. Whether the belief was well founded or not, Professor Kocher laid great stress upon refrigeration. "Back to the hills and the open" was his oft-repeated order to those whom he did not consider safe operative risks. The local application of ice to the gland and præcordia gives, for obvious reasons, a certain measure of relief. Crile's advocacy of ice packs in the severe forms of hyperthyroidism with fever is accepted as rational, and is being more extensively practised.

Rest. The most important of the therapeutic measures is rest. Rest in bed with the administration of sedatives during a crisis and proper dietetic measures will cure some of the most forbidding cases of Graves' disease. To secure results, however, the rest treatment must be prolonged, and for this reason it is seldom accepted where a surgical operation offers a hope of earlier and permanent restoration to normal health and activity.

X-ray treatment. We have no reliable data upon which to found the belief that x-ray treatment of hyperthyroidism is either curative or palliative. Improvement in symptoms or even a complete cessation of symptoms, within from three to six months after a course of exposures, cannot with certainty be ascribed to the effects of the x-rays. Spontaneous recoveries and normal remissions may account for many of the reported cures. Metabolic observations may throw light upon this question. One may, however, state with assurance that the scarring induced by the use of the x-rays renders subsequent operative treatment more difficult.

Cauterization and injection with boiling water. Partial destruction of the exposed gland by the actual cautery or the production of necrosis by injections of boiling water are two methods of treatment with which I have had no personal experience. The former would appear to carry as great a risk as ligation or partial lobectomy, while the latter is an uncontrolled procedure

and is unlikely to become widely practised. It is, moreover, not without its attendant death rate.

Operation. It is important to recognize the fact that operation is not essential to the cure of hyperthyroidism, nor does cure invariably follow operation, although a better understanding of the disease and earlier reference to the surgeon is leading to an increased percentage of operative cures in both Graves' diseases and toxic adenoma. The indications for operative treatment in Graves' disease and toxic adenoma have become more clearly defined. In toxic adenoma the basal metabolic rate seldom exceeds plus 30 or 35. Excision of the nodule or nodules gives almost immediate relief from symptoms, and in 85 per cent. of cases leads to a permanent cure. The basal metabolic rate will be found to drop from plus 30 or 35 to plus 8 or 10 within three weeks of operation.

It has long been recognized by surgeons that certain cases of hyperthyroidism were cured in a phenomenally short space of time after lobectomy, while others, apparently of the same type and degree of intoxication, showed little or no improvement after operation. Many of these cases belonged to the group of discrete nodular adenoma, and the failures are to be ascribed either to the removal of the wrong lobe in cases of solitary adenoma, or to the fact that the surgeon did not observe that the disease was bilateral. For this reason complete exposure and direct palpation of the whole gland should be carried out.

In Graves' disease the surgeon is confronted with a most serious medical as well as surgical problem. It is in this group that the estimation of the basal metabolic rate is of greatest assistance—not, however, that it can be said that all cases below a certain rate are operable and all above it inoperable, for such is not the case. For example, polar ligation or thyroidectomy may be undertaken with less risk in an individual returning, so to speak, from an attack than in one entering upon an attack or crisis, even if in the former case the basal metabolic rate is much higher than in the latter. Repeated estimations are a guide as to which direction the patient is taking, whether toward a crisis or toward a recession. Generally speaking, the metabolic rate and the pulse rate show a definite parallelism, but, while the pulse rate is susceptible to individual variations and reacts to various stimuli, mental, ocular, auditory, and cutaneous, not to mention the irregularities which may be due to

myocardial changes, the metabolic rate remains unaffected so long as observations are made under the conditions before described.

The symptoms which portend a grave operative prognosis are (1) a high basal metabolic rate; (2) rapid loss of weight; (3) rapid loss of strength, of which loss of power in the quadriceps and inability to "step up" are valuable indices; (4) rapid pulse, oedema, auricular fibrillation; (5) vomiting and diarrhoea; (6) heat intolerance; and (7) fever.

It is important that patients upon whom operation is contemplated should be under observation for at least a week. Operation without preliminary rest and adequate investigation is responsible for a large percentage of the operative deaths. If there is one disease in which hurry-up remedies should be discountenanced, it is surely Graves' disease. An intimate clinical knowledge of a given case can be acquired only by observations which include, as a routine and apart from general physical examination, an examination of the blood, clinical and bio-chemical; electrocardiographic readings; x-rays of the upper thorax; and repeated determinations of the basal metabolic rate. Nor is it to be assumed that, because after a week's rest in bed all symptoms improve and the pulse rate falls from 120 to 90 or even 80, radical thyroidectomy may be undertaken without risk. It is the experience of those who have treated the greatest number of cases, under the most favourable conditions, that even such comparatively simple procedures as single ligation under local anaesthesia, or the injection of one lobe with boiling water, have an attendant death rate. It is also the experience of these men that in many cases a complete cure can be effected only by repeated operations; for example, a single ligation to begin with; at the end of three or four weeks a second ligation; and after the lapse of a further period of weeks or months a partial or complete thyroidectomy. We have come to realize that in Graves' disease, as also in toxic adenoma, a lobectomy is not the punishment which fits the crime. In a large percentage of cases, permanent cure is to be secured only by an operation in which approximately four-fifths of both lobes, together with the isthmus is removed. After this type of operation the basal metabolic rate will in the average case drop rapidly from plus 50 to plus 20 or 15, the average pulse rate from 115 to 90 or 85. The immediate relief of the more distressing subjective symptoms, especially heart thumping, is a striking feature.

Complete cures follow in about 65 per cent. of the cases; in an additional 15 per cent. there is a marked improvement. Many of the cases classified as improved are cured of hyperthyroidism, but not of the myocarditis to which the residual symptoms are referable.

In considering the death rate from operation in Graves' disease, one must not lose sight of the fact that there is a mortality in unoperated cases. There are no reliable data upon the death rate in these cases, and it is therefore impossible to state in figures how much surgery has contributed to the reduction of the mortality of all cases.

Rest is an important adjuvant in the surgical treatment of Graves' disease—rest both before and after operation. After operation the best results are obtained where a period of three months' rest is rigidly maintained. In fact one might go so far as to say that, unless these patients are prepared to devote this period of time to their convalescence, many of them will, at the end of six months or more, be found to be still suffering from hyperthyroidism.

One may well ask how it is that a radical surgical procedure should be so slow in yielding results. The probable explanation is that the symptoms of hyperthyroidism in exophthalmic goitre are not wholly due to increased activity of the thyroid gland, but that the gland only bears the brunt of a disease which involves simultaneously other glandular as well as nervous elements concerned in maintaining the balance of the internal secretions.

Each case must be treated on its merits as to time and type of operation. Primary thyroidectomy is the operation of choice, and is done in all cases of toxic adenoma, unless there is myocardial disintegration with oedema. Preliminary ligation, unilateral or bilateral, is indicated in about half of the exophthalmic cases. A high basal metabolic rate, rapid loss of weight and strength, vomiting and diarrhoea, preclude anything more than polar ligation. Loss of weight is of particular importance as an index of the degree of intoxication as well as of the duration of a particular attack. Generally speaking, no operation should be undertaken during a crisis. However limited the surgical procedure, it is invariably followed immediately by a rise in the basal metabolic rate. The possible extent of this rise, with the accompanying exacerbation of all symptoms, must be estimated as far as possible and deducted from the margin of safety.

I would say again that it is only by close observation in each case that one may hope to acquire and display a rational judgment as to when operation should be undertaken and what type of operation is suitable to the particular case. If during the course of an operation the pulse rate should rise rapidly, the wound should be packed and the operation completed at a later date. A delayed primary suture of the wound may be indicated, if for any reason the operation has been prolonged.

An excessive rise of temperature, with acute exacerbation of all symptoms after operation, is best treated by ice packs or colds baths.

The choice of the anæsthetic must rest with the surgeon. Local anæsthesia, nitrous-oxide-oxygen, ether, or a combination of either nitrous-oxide-

oxygen or ether with local infiltration, offer a fairly wide choice. Local anæsthesia should be used for preliminary ligations; in all cases where there is pressure on the trachea; in all cases of intra-thoracic goitre; where bronchitis is present as a complication; or where there are myocardial changes.

Because of the better classification of cases of hyperthyroidism and the new methods available for estimating the degree of intoxication, statistics upon the curative results of operation will show progressive improvement. Much can be done to eliminate risks, hasten convalescence, and increase the percentage of cures, by close co-operation between the internist and the surgeon and the submission of cases to operation before irreparable myocardial changes have developed.

On Nurses and Nursing.—In view of the shortage of nurses, certain provisions for nursing service require attention. The mere possession of wealth should not be sufficient reason for a single patient having three or four trained nurses in attendance, while other persons less blessed with large incomes are deprived of the service of a single nurse. Senile persons and those afflicted with chronic but harmless ailments should have no particular claim upon a trained nurse's service while victims of acute disease are suffering for the want of necessary nursing attention. In a large proportion of the diseases of childhood nursing service does not require a highly trained nurse, but the wants of the youngster may be thoroughly satisfied by the attentions of an intelligent mother or some type of trained attendant.

Physicians are vitally interested in nursing problems, and possess a peculiar responsibility with reference to their training and to the development of the types of nurses which are in demand for the different phases of public service. It is particularly necessary to realize, as is pointed out by J. B. Howland, *Boston Medical and Surgical Journal*, November 25, 1920, that the better trained nurses are not likely to be available to the same extent as formerly for private duty

with sufferers from chronic diseases and the temporary victims of minor illnesses, but the necessary care in these instances can properly be given by trained attendants. It is a waste of education to utilize highly trained nurses for such minor duties as are required in the average doctor's office, in the management of most chronic diseases, as laboratory assistants, as telephone operators, or even as anæsthetists. Some readjustment in education is required in order that courses may be provided that will supply a basic, general training common to all forms of nursing, to which may be added a variety of special forms of training leading to the development of capability and some special useful ability. In fact, our training schools for nurses now are obliged to consider the public needs in contemplating a nurse's curriculum. They can no longer follow a traditional form of training mainly designed for caring for hospital patients or for private duty. Less technical knowledge is not opposed to effective nursing service. Furthermore, hospital training schools, as pointed out by Howland, must offer really educational courses with well planned lectures by paid and capable instructors. *American Medicine*, December, 1920.

Editorial

VITAMINES OR ACCESSORY FOOD FACTORS

THE discovery, that there are other nutrients necessary to a normal diet than proteins, fats, carbohydrates and salts, is the result of the researches of the last fifteen years, initiated by Professor F. Gowland Hopkins of Cambridge, who found that young animals would not grow or live on a diet made up of the purified proteins, fats, carbohydrates and salts extracted from milk, although animals similarly fed would thrive if a trace of milk or egg yolk were added to such diet. Professor Hopkins' results led him to conclude that not only in growth but also in the condition of well-being there are obscure factors involved the absence of which in diets account for such diseases as rickets and scurvy. His observations which were published in 1906 excited interest and stimulated the researches, almost wholly amongst British and American biochemists during the last eight years, the results of which have thrown a flood of light on the causation of a number of diseases of nutrition such as rickets, osteomalacia, marasmus, beri-beri or polyneuritis, scurvy and pellagra.

It has been established as the result of researches of the last eight years, that all of these diseases, except the last named are each due to the absence of one factor and that at least three such factors must be present almost constantly in a diet if the human subject is to escape all these diseases. Voegtlin claims as a result of his observations on pellagra that the absence of all three

from the diet of a certain portion of the white population of the Southern States during the winter months leads to the development of this disease in the spring when its incidence is greatest.

These factors, provisionally grouped as Vitamines or Accessory Food Factors, may, for convenience, be termed the anti-rachitic, the anti-neuritic and the anti-scorbutic. They are, it is held, formed only in the vegetable kingdom and from the vegetable constituents of the diet animal tissues ultimately derive their supply of them which may be stored up in fat, muscle, liver, and egg yolk and secreted in milk or excreted in urine.

The anti-rachitic vitamine which occurs in butter, milk, cream, cheese, animal fat (but not in lard or vegetable oils), cod-liver oil, egg-yolk, spinach and lettuce promotes normal growth and nutrition. It is more commonly known as the "Fat Soluble A" Factor, because it is commonly found dissolved in or associated with fat and it is probably of lipoid character. Its absence from a diet, if continued for a prolonged period, causes rickets and marasmus in growing or young subjects and an imperfect or deficient calcification of the osseous tissues or osteomalacia in adults. Its absence from a diet also gives rise to xerophthalmia, an inflammatory condition of the conjunctiva and eyelids leading, if unchecked, to blindness, a disease not unknown as a result of pronounced rickets but which in animals can be cured in a few days by the addition to

their food of cod-liver oil, butter, milk or cream. It was the lack of this vitamine that caused the extraordinary prevalence of rickets, marasmus and osteomalacia in the 30,000 children of Vienna during and immediately following the war.

The anti-neuritic vitamine occurs in all green vegetables and especially in the pericarp of the rice grain. It is soluble in water and hence is called the "Water Soluble B" Factor. When polished rice is the sole article of diet beri-beri, a polyneuritic affection fundamentally, develops and proceeds so far as to terminate fatally, but animals affected, even when moribund, are cured in a few hours by the injection of a concentrated extract of rice polishings.

The anti-scorbutic factor obtains in all green vegetables, raw potatoes and fruits, but is destroyed when these are heated or dried. It occurs also in yeast and fresh meat (not in "tinned", salted, or cured.)

The attempts to separate these vitamins individually each in a pure form have not, so far, met with much success. They occur in food stuffs in such minute amounts that enormous quantities of the raw material containing them have to be subjected to extraction to furnish even traces of them. Their chemical characters are therefore, almost wholly un-

known. They break down or are decomposed on purification. The anti-neuritic vitamine, as it is concentrated, decomposes, loses its property of curing polyneuritis in animals, and yields products, one of which is nicotinic acid, a point that may be of interest to the lovers of "the weed."

Heat, up to 100°C, if prolonged gradually affects the anti-rachitic and anti-neuritic vitamins while it at once destroys the anti-scorbutic element. Milk, which contains all the vitamins, may accordingly be pasteurized without wholly destroying the anti-rachitic and the anti-neuritic factors, while if the anti-scorbutic one is broken down the loss may be made good through the addition of a small quantity of fresh orange juice.

It is possible that what is already achieved in the researches on the vitamins is only the beginning of a knowledge of the subject which in years to come may play a very great part in the treatment of diseases of nutrition. The enthusiasm of a host of biochemists eagerly working in this field is indicative of the importance they attribute to these food factors. It is also possible that if they are isolated each in a pure form and their constitution carefully determined, their synthesis in the laboratory may not be a far-off event!

THE VALUE OF AN ESTIMATION OF THE UREA CONTENT OF THE BLOOD

ATENTION is directed to the article appearing in this issue upon the Study of the Chemistry of the Blood in its relation to acute abdominal conditions. Even at the risk of being charged with unnecessary reiteration in

these columns we feel that the subject of the "Acute Abdomen" is of such importance as to warrant almost continuous consideration.

It is true that the article does not pretend to be more than a preliminary

report from which definite conclusions should not be drawn; and moreover it deals with the prognostic rather than with the diagnostic or therapeutic aspects of disease which perhaps is not of such immediate practical value. Nevertheless it marks the advent of original work in the field of clinical surgery and as such demands attention and suggests similar investigations in the hospitals throughout the country, to the end that good may accrue.

Nor are these investigations necessarily confined to hospital laboratories. We are informed that the tests take but a modicum of time with apparatus costing but ten dollars.

At the Montreal General Hospital, from the laboratory of which the article emanates, the experience has been that not only are the blood findings of prognostic importance, but in a few obscure cases of incomplete intestinal obstruction have already proven of diagnostic value and have determined prompt operative interference with satisfactory results.

When interpreting the term "Acute Abdomen", we are accustomed to regard the term as implying a condition of

general peritoneal involvement resulting from a local lesion and threatening life; examples are appendicitis and perforations of the hollow viscera. The difficulty in making an accurate diagnosis lies chiefly in determining the locus of the original lesion; operative treatment is usually indicated and the lesion is dealt with wherever found. It would indeed be a foolhardy procedure to dally with an extending peritonitis in order to more definitely diagnose the original focus.

But of only slightly less importance are those cases which may be designated as the "Subacute Abdomen", in which no real peritonitis is present but in which there is marked distention, and the patient is too ill to undergo a prolonged routine examination. Examples are Richter's or internal herniæ with incomplete obstruction.

If, in such cases, with effectual or partially effectual bowel evacuation, a rising blood urea proves to be an indication for operative interference in spite of a temporary improvement in clinical appearance this application of blood chemistry will have a life saving value.

The Association

THE HALIFAX MEETING

ARRANGEMENTS for the 1921 annual meeting of the Canadian Medical Association at Halifax are well under way. The following is the General Committee:

Dr. Murdock Chisholm, *President*.

Dr. S. L. Walker, *Chairman*.

Dr. W. L. Muir, *Secretary*.

Dr. H. K. MacDonald, President Nova Scotia Medical Society.

Dr. J. G. MacDougall, President Halifax Medical Society.

Drs. A. I. Mader, J. R. Corston, A. G. Nicholls, E. V. Hogan, G. R. Murphy and G. A. MacIntosh.

Chairmen have been appointed for Committees on programme, papers, entertainment, printing, lodging, exhibits, finances, etc. These several Chairmen have selected others to work with them, and already substantial progress has been made.

The general meetings will all be held in the Library of Dalhousie University, a room admirably suited for the purpose, being sufficiently spacious and having very good acoustic properties. Meetings of Sections, registration and business offices, and exhibits, will use very suitable rooms in the main University building. The University is easily reached by electric cars, and motors will be available at all times. The situation on the North West Arm is an ideal one for a summer convention.

The programme is already taking shape. Sir G. Lenthal Cheate of London will give the address in Surgery, and Dr. D. L. Richardson of Providence that in Medicine. Papers have been promised by Drs. Chipman, Archibald and Garrow of Montreal; Dr. Risdon of Toronto, and Dr. MacAusland of Boston. Dr. W. J. Mayo has written stating the hope that either he or his brother would be present, but in any case a member of their Clinic will attend. The Committee is in correspondence with other prominent doctors in Canada and the United States. Readers of the JOURNAL who desire to add to the success of the gathering by their

contributions should advise the Committee as soon as possible.

The principal Hotels in Halifax are the Halifax, Queen, Carleton, King Edward, King George, and they believe they can easily provide the necessary accommodation. The Lodging Committee has assured the General Committee that every one will be comfortably and reasonably housed.

Already some applications for space in the exhibit hall have been received, and as the place is admirably adapted for this purpose, a good exhibit is expected.

The Entertainment Committee believe they will be able to make every visitor realize that Halifax is a city of splendid hospitality. Probably next month an outline of the Entertainment programme can be given.

The General Committee is now so sure of their work that they feel that success of the meeting of 1921 depends upon the number of members attending from Quebec, Ontario and the West. The Maritime Province men will attend in large numbers.

Anyone desiring information or willing to contribute to the programme should write to the Chairman of the Programme Committee, Dr. A. I. Mader, 57 Morris St., or the Chairman of the General Committee, Dr. S. L. Walker, 14 Carleton St., or the Secretary of the Committee, Dr. W. L. Muir, 245 Robie St.

HOTELS

Halifax Hotel.

American Plan only, \$5.00 to \$6.00; \$5.00 without bath and \$6.00 with bath.

Queen Hotel.

American Plan only, rooms \$4.50 to \$5.50. \$4.50 without running water, \$5.00 with running water, \$5.50 with bath.

Carleton Hotel.

American Plan only, \$4.00 to \$5.50. \$4.00 without bath. \$4.50 with running water, and \$5.50 with bath.

Correspondence

INCOME TAX RETURNS

To the Editor,—

I HAVE to acknowledge receipt of your letter of the 21st inst., and note your Association are undertaking the production of a medical journal and would like to give publicity therein to the manner in which members of the medical profession shall keep their records with a view to making proper income tax returns.

I feel that something of the nature which you suggest will be of mutual benefit, not only to the medical profession but to other professional men, as well as to this department.

For your information I may say the following is a general outline of the basis on which doctors, lawyers, or other professional men are taxed under the Income War Tax Act, 1917:

1. Accounts receivable or accounts rendered, together with cash received as shown by the Cash Book, shall form the basis on which a tax shall be made. The income thus shown, whether actually received in cash or not, shall be taxable income.
2. That cash received within a taxation period, otherwise than in respect of accounts rendered which have already been used as a basis of return, shall be considered as taxable income for the period in which received.
3. Cash received on account before an account is rendered, and which has already been treated as taxable income, shall be deducted from accounts receivable in calculating the income in respect of such an account.

The three preceding numbered paragraphs are in respect solely to income from professional income, and have no bearing on "other income" which will be included in the return in the usual manner.

For Income Tax purposes net income means gross income less the deductions and exemptions allowed by the Act. In all cases gross income must be shown and full data given of any deductions claimed. Subject to the taxpayer's right of appeal, the officials administering the Act are the judges of what are proper deductions from gross income in accordance with the Act,

and the taxpayer will not be excused from liability for the omission of items of gross income on the ground that he believed them exempt from taxation or proper deductions from income. Under gross income must be recorded every item of income derived from any source whatever actually received or accruing (see paragraph 1 above) during the calendar year for which the return is rendered, whether received in cash or the equivalent of cash.

I have no doubt from the above you will obtain what you desire, but should you wish it enlarged upon I shall be glad to reply to your further representations.

I might add that where a doctor or professional person is in doubt on any point regarding the filling of his Income Tax Return, he should apply to the Inspector of Taxation in charge of the Taxation District in which he resides. These inspectors are at all times willing to furnish any information or assistance, free of charge, to any taxpayer upon application.

Yours faithfully,

P. W. BRADEUR,
Commissioner of Taxation

THE ADMINISTRATION OF ARSENICAL PREPARATIONS FOR THE TREATMENT OF SYPHILIS

To the Editor,—

THE following suggestions may be of some value to your readers in general practice:

In the administration of phenarsenamine (the Provincial Board of Health "606" preparation), or other arsenical preparations for the treatment of syphilis, the following points should be carefully considered:

A. Before Treatment:

1. Minor acute illnesses (such as colds, bronchitis, etc.) should be considered temporary contra-indications to intravenous treatment. It should be remembered that, occasionally, under

arsenical treatment, chronic skin diseases may become acute.

2. A fat person does not, as a rule, tolerate the drug so well as a spare muscular person.

3. Before anti-syphilitic treatment is begun a urinalysis should be made.*

4. The night before the administration of the drug a laxative should be given.

5. Solid food should not be taken by the patient for at least six hours before treatment.

6. The initial dose should not be more than 0.3 grams in men or 0.2 grams in women.

B. Treatment:

1. "606" preparations are more stable than "914" ones.

2. The treatment should be given with the patient in a recumbent position with the head slightly raised on a pillow.

3. With 606 or phenarsenamine the solution should never be given more concentrated than 0.1 grams to 20 c.c. of freshly distilled water.

With neo preparations a concentrated solution 0.1 grams of the drug to 3 c.c. freshly distilled water may be used, provided it is given very

* An acute kidney lesion should be considered a contra indication to the use of arsenical preparations.

slowly at a rate not exceeding 0.6 grams in two minutes. More dilute solutions given by the gravity method are less likely to cause reactions than concentrated solutions, particularly if the latter are rapidly administered.

4. The drug should be administered immediately it is prepared.

5. The strictest asepsis should be observed.

C. After Treatment:

1. After administration the patient should be kept quiet (preferably recumbent) and under observation for at least half an hour. A hypodermic solution of adrenalin chloride should always be readily available for injection at the first sign of any reaction.

2. No solid food should be taken by the patient for at least four hours after treatment.

3. If signs of dermatitis or jaundice appear treatment should be discontinued.

Mercury should be given as part of the treatment. Intramuscular injections or inunctions appear to be the best method of administration.

Yours truly,

JOHN W. S. McCULLOUGH,
Chief Officer of Health for Ontario

Retrospect

THE DETERMINATION OF BASAL METABOLISM BY ESTIMATION OF THE RESPIRATORY EXCHANGE (INDIRECT CALORIMETRY) AS A CLINICAL METHOD IN THE DIAGNOSIS AND TREATMENT OF HYPERTHYROID AND HYPOTHYROID STATES

MAUDE E. ABBOTT, M.D.

THE "basal metabolic rate" of the individual is to be defined as the numerical expression of his minimal heat production during the post-absorptive or fasting and resting state (*i.e.*, twelve to eighteen hours after the ingestion of food, and with the organism at complete muscular rest), either by direct observation of the heat elimination made in a respiration chamber, (*direct* calorimetry), or by the calculation of the heat production based on the amount of oxygen

absorbed and the carbon dioxide expired (*indirect* calorimetry), or by both methods combined.

In earlier studies in this field calorific values were expressed as such; the establishment of normal values for age, sex, and surface area have made it possible to state these in terms of percentage of the individual, which is a convenient form and is what is meant by "basal metabolic rate".

Direct calorimetry is a complicated and costly

procedure, inapplicable to routine clinical use. But the researches done by its means have made possible the practical application of the indirect method. Indirect or respiratory calorimetry, with which we are here directly concerned, has on the other hand a relatively simple technique, and the determination of basal metabolism, or minimal heat production, by one or the other of its methods has come into prominence within the last five years as a clinical procedure, of wide application, which is of especial value in diagnosing and guiding the therapy of many obscure pathological states, chief among which are disorders of the internal secretions, especially of the thyroid gland. The present status of this subject, which has just passed from the realm of scientific knowledge to that of practical clinical application, is a brilliant example of that effectual concerted action by which modern science has achieved its greatest results. Through the labours of many workers, first among whom should be mentioned Krogh, Haldane, Benedict, Carpenter and Lusk, and by the active correlation of the results of all, an extremely difficult process, involving complicated apparatus and an extensive series of calculations, has been reduced to terms of the greatest simplicity, and to a procedure, the application of which must be considered quite as rational and even as essential as is the Wassermann test in syphilis, or the use of the thermometer in febrile states. Indeed, the fluctuations of heat production or basal metabolism bear a close analogy to the range of the body temperature in health and disease.

The study of calorific values was initiated on this continent in 1904 by Atwater, from Voit's laboratory, by means of the Atwater-Rosa calorimeter. This was replaced in 1905 by the greatly improved Atwater-Benedict chamber, which was installed in the Carnegie Institute laboratory (erected to receive it) at Boston under the charge of Prof. F. G. Benedict, and was used by him for extensive researches into the standardization of apparatus in the resting, fasting, and diabetic states. In 1912 Graham Lusk installed a small calorimeter for animals and infants at Cornell, and in a series of studies on animal calorimetry (published in the *Journal of Biological Chemistry* from 1912 on) cleared up other fundamental problems and led the way to further researches. The next step was the establishment, at the Russell Sage Institute, of the large respiration calorimeter with combined system for the simultaneous determinations

of the respiratory exchange by the closed-circuit method of indirect calorimetry, the so-called universal apparatus of Benedict, which was constructed by him in 1912 with the object of such an attachment in view and with the intention of bringing this complicated procedure closer to the needs and capacity of the clinic. Then followed that remarkable series of studies by DuBois and his associates entitled, "Clinical Calorimetry", (published in the *Archives of Internal Medicine* from 1915 on), by which normal values were established, a height-weight curve for the estimation of surface-area supplied, and the extremely important point of the close agreement between the results obtained by the methods of indirect and direct calorimetry definitely proved.

The various forms of respiratory apparatus in use up to the year 1915 were described by Carpenter in an exhaustive comparative study published by the Carnegie Institute (I. 3). He corroborated the close agreement between direct and indirect calorimetry demonstrated by DuBois, and differentiated two types of apparatus for the estimation of respiratory exchange: (a) the so-called closed circuit method, of which the Benedict Universal apparatus is the best example. In this, the subject breathes directly into an apparatus in which the carbon dioxide given off is separated by a chemical process and the oxygen consumed replaced, and the amount of each determined by weight, and used for the basis of calculations. This method, used by Professor Benedict in his "Universal" apparatus, devised especially for the purpose of combined studies with the respiration chamber and for independent clinical work, was repeatedly improved (I. 4) by him to a point of great perfection so far as the limitations of a method by weight alone admit; the new "Benedict Portable" is a modification of it for rapid estimation of the basal metabolism by oxygen consumption. (b) The gasometer or open-circuit method, ("Modified Tissot") in which the patient is connected by tubes provided with face-mask and respiratory valves with a spirometer tank or other closed chamber, in which the expired air is collected and from which samples are later withdrawn and their content determined by the Haldane gas-analysis apparatus.

The field of indirect calorimetry *per se* was first entered by J. H. Means working at the Massachusetts General Hospital (service of Professor Edsall) with the Benedict Universal apparatus,

and shortly thereafter by Walter M. Boothby, who introduced the modified Tissot at the Peter Bent Brigham Hospital of Boston (service of Dr. Harvey Cushing). Both these laboratories were operated in close communication with the researches by direct calorimetry proceeding at the Carnegie Nutrition and Russell Sage Institutes; and standardization of apparatus and accumulation of data on thyroid, pituitary, and cardiac cases, with records of effects of drugs, thyroid medication and other treatment, went forward rapidly. The removal of Dr. Boothby and Miss Irene Sandiford to the Mayo Clinic in 1917 in Dr. Plummer's service, gave an immense impetus to the Tissot work by supplying to them a field of wide scope and rich material. Since then in their hands the gasometer method has been further reduced, by the utilization of manual labour under systematic checking of results and other means, to a process of real simplicity and of very rapid application, as is evident from their record of over ten thousand observations made in their laboratory in the last four years!

The final steps in the evolution of these two methods of clinical calorimetry have been taken, (a) in the unit system by the construction by Benedict in the year 1918 of his small portable apparatus for the rapid bedside determination of basal metabolism by oxygen consumption without weighing or analyzing; and (b) in the gasometer system, by the publication by Boothby and Sandiford of their manual on the basal metabolic rate, (Saunders, 1920), in which the entire detail of their modified Tissot technique, with abridged calculations and facsimiles of charts, is set forth, with a clearness that renders its application easy and practicable for any hospital or office where a gas analyst can be trained. The book contains all the information necessary for a thorough understanding of the subject, including a description of the two other apparatuses recommended for clinical work, the Benedict Universal or Unit and the new Benedict Portable. The authors state that they have selected the Tissot for their own observations and recommended it in preference to the unit system because of its broader application and the more exact nature of the data obtained by the gas analysis required; they consider this gas-analysis an asset rather than a drawback, as opening the door to a wider field of investigation of the respiratory exchange, and claim that the loss of time in it, is offset, in the Benedict, by the

time expended in the care of this apparatus, which must be tested daily for leaks; these represent a loss of oxygen, which means a serious invalidation of results, and not a loss of air as in the case when leaks occur in the Tissot. They state further that in the Benedict portable the carbon-dioxide values are too high for use in obtaining the respiratory quotient, and that it cannot be cleaned.

The question of the relative advantages and uses of the Benedict portable and the modified Tissot have been made the subject of a careful study by Carpenter, Hendry and Emmes (I. 7). Their statement is similar to the above, in that they conclude that when rapid determinations of the basal metabolism only are required and approximate values suffice, the portable Benedict is to be recommended as avoiding the time consuming gas-analysis of the Tissot; but when information is required upon the action of food or drugs, or the respiratory quotient, or exact data of any kind, the modified Tissot should be used; and they also offset the disadvantage of the gas-analysis by the ability which it brings to the investigator, and the wider field of vision which he gains into the by-paths of respiratory research. Albert H. Rowe in an admirable article recapitulates these points and decides for the Tissot, pointing out that Benedict and Carpenter have both said that a method by gas-analysis where this can be carried through is to be preferred even to the unit system; so also Snell, Ford and Rowntree, who cover the literature well and give an account of 750 observations; and Gardner and Peppard of 400 cases.

McCaskey on the other hand reports a most interesting series of observations done by the portable Benedict, and is enthusiastic in his appreciation of it; as also Else, and a number of other workers who have used this apparatus.

The Benedict portable is undoubtedly a valuable clinical acquisition for the routine determination of basal metabolism where detailed methods are not feasible. Confusion will be avoided, however, if it be recognized that it has its definite place in the clinical armamentarium, and does not replace either the Benedict Unit or the gasometer. Benedict himself, in his most recent article, utters a most serious warning, that the many observations made upon it by relatively unskilled workers be not inaccurately construed. And it would seem to us essential that behind the operation of this technical aid, there should stand in every hospital of good

reputation a well equipped respiration laboratory. For this the modified Tissot eminently recommends itself, both by its neat and cleanly procedure and by the simplicity of the Boothby-Sandiford technique.

The reference to Cathcart's article is given in the literature of this retrospect because it describes the Douglas Bag method by which the extensive work carried on in England has mostly been done.

A word only can be said on the clinical import of alterations in the basal metabolic rate as revealed in the very large number of observations which the literature cited here represents. Normal changes lie between relatively narrow limits of -10 and $+10$ per cent., following a similar range, although with somewhat greater fluctuations, to that of the body temperature. Variations appear to depend upon alterations in the active principle of the thyroid secretion, which has to do with the regulation of heat production; and very high values, as $+80$ to $+100$ per cent. may be said to be pathognomonic of hyperthyroidism. The converse applies to hypothyroidism, in which the rate may be depressed to the lowest figure consistent with life (-40 to -45 per cent.). A raised rate is most useful in the differentiation of thyrotoxic from adenomatous goitres, and in the diagnosis of those "borderline cases" of thyroid toxicity without exophthalmos which demand treatment, yet frequently escape recognition. In the "Irritable heart of soldiers", the normal rate has supplied a valuable negative point against the hyperthyroidism sometimes hypothesized. Alterations in the rate with corresponding changes in the clinical picture, follow administration of thyroid with almost mathematical accuracy, and supply an invaluable index in the gradation of therapeutic doses of thyrotoxin, which is cumulative in its effect. Similarly, in hyperthyroidism the surgeon is guided to a definite knowledge of what cases demand interference, and of the effect of lobectomy or x-ray treatment, when these steps have been taken, by estimations of the metabolic rate. Without it, he will operate unnecessarily on many cases, and on many others without the success that should be his due.

In conclusion, in any review of this subject a tribute must be paid to Professor F. R. Benedict, who has from the first directed the energies of the Carnegie Institute Laboratory to the practical application of the knowledge gained by the researches which constitute its field, and to

whose efforts, seconded by those of Professor Carpenter, the present success of both the unit system and the gasometer method as clinical procedures are primarily due.

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Abstracts from Current Literature

SURGERY

Some Principles Involved in the Treatment of Empyema. GRAHAM, E. A.: *Surg. Gyn. and Obst.*, 1920, Vol. 31.

In this article Graham reviews three previous articles by himself and Bell. 1. Open Pneumothorax; its Relation to the Treatment of Empyema: *Am. Jour. Med. Sci.*, 1918, 156, 839. 2. Protrusion of Artificial Pneumothorax into the Opposite Untreated Side: *Jour. Amer. Med. Assoc.*, 72, 1445. 3. The Maximum Non-fatal Opening of the Chest Wall: *Jour. Amer. Med. Assoc.*, 1919, 73, 1934.

It is shown that the former prevalent conceptions of the mechanism of action of an open pneumothorax are incorrect.

In the normal thorax the mediastinal structures, instead of constituting a more or less rigid partition between the two pleural cavities, are in reality so mobile that to air pressure they offer a resistance which is equivalent to the pressure exerted by a column of water only 0.5 c.c. to 1.0 c.c. high. The thorax can thus be considered as one cavity instead of two. Pressure in one cavity compresses both lungs about equally. The situation in this respect is the same in the dog as in the human; experimental results obtained on the dog can be directly applied to the human.

The likelihood of a fatal asphyxia as the result of an open pneumothorax depends upon a number of factors. Important are the size of the opening and the vital capacity of the individual.

The maximum non-fatal opening can be determined mathematically. An average vital capacity (3700 c.c.) can withstand an opening in the thoracic wall of fifty-one square cm. (eight square inches), but the individual of exceptional vital capacity (as for example 7,100 c.c.) can live with an opening of 101 square cm. (15.6 square inches). If the vital capacity is so low as to approximate the tidal air, even a very small opening may be fatal.

After adhesions have formed the pressure

relationships may be materially different on the two sides.

The article briefly considers other effects of open pneumothorax such as heat loss, changes in the systemic circulation, and infection.

The value of Dakin's solution in sterilizing and obliterating empyemic cavities is shown as well as its decorticating activity.

F. B. G.

Thoraco-Abdominal Injuries: Some Technical Procedures Developed by the War.

HEYD, C. G.: *Annals of Surgery*, 1920, Vol. 72, p. 370.

In the earlier work injuries to the diaphragm were repaired through the abdomen; it was only when a rational technique was established that it was found easier to repair the diaphragm through a thoracotomy wound. Even large tears can be easily sutured or approximated to the chest wall. It is essential that tears in the diaphragm be repaired.

There are obviously well defined limits to the amount of work that could be performed upon the viscera of the upper abdomen through the thoracotomy wound. Secondary laparotomy was necessary to supplement the thoracic technique and to deal specifically with the abdominal condition.

It was early established that the lung tissue itself, by reason of its peculiar vascularity, was quite able to take care of a considerable degree of infection. The handling of the lung was not associated with marked fall in blood pressure and was not associated with the same degree of shock as would be induced by similar manipulation of the intestines.

A critical review of thoraco-abdominal injuries and the surgical procedures adopted to deal with them together with the immense collective experience derived from battle surgery, would seem to suggest a wider technical application to major thoracotomy to deal with lesions involving the diaphragm and the viscera immediately subjacent to it. Lesions of the diaphragm (hernia), of the liver, superior cardiac

portion of the stomach, and some spleen lesions might offer better results by transthoracic laparotomy than by the present classical method.

F. B. G.

Diaphragmatic Hernia. BEVAN, A. DEAN.: *Arch. of Surg.*, 1920, Vol. 1.

BEVAN has recently operated upon four cases; this contribution is based upon a study of these cases. Hernia through the diaphragm is, 1. Congenital, 2. Acquired (as in ordinary inguinal hernia). 3. Traumatic. Group one may occur at one of several points: (a) In front at junction of ensiform and costal cartilages, (b) Between the psoas muscle and ribs, (c) Oesophageal opening, (d) Opening for vena azygos and phrenic nerves. In cases of congenital hernia the presence of symptoms determines operation. In acute traumatic cases operation for repair of the diaphragm may be either by abdominal or thoracic route. Bevan's paper deals with hernia of acquired type. These occur through the oesophageal opening on the left side. Contents consist of stomach, omentum, transverse colon, and rarely the small intestine. The condition is analogous to inguinal hernia; *i.e.*, a sac is present, sometimes reducible, sometimes irreducible.

The clinical symptoms are those of abdominal distress, such as are present in gastric ulcer, gall-stones, or pyloric obstruction. In one case pain was severe and simulated gall-stone icolic. When the colon is included the symptoms simulate carcinoma of the large bowel. The radiograph makes the diagnosis.

If symptoms are present an attempt at surgical cure should be made. Bevan uses S incision. Reduce the hernia by traction and suture the pillars of the diaphragm, taking large bites. Bevan states that closure of oesophageal opening is comparatively simple through an abdominal incision. In addition he has sewn stomach to the diaphragm or to the parietal peritoneum. Post-operative treatment is similar to that for pyloric resection. Instructive drawings and adequate reports of cases accompany the article.

F. B. G.

Tendon Transplantation for Wrist Drop.

SPEED, KELLOGG: *Surgical Clinics of Chicago*.

MENTION is made of an operation for the temporary relief of wrist drop, by transplanting one-half each of the flexor carpi radialis and ulnaris tendons into the bases of the second

and fifth metacarpal bones respectively. This did not, however, relieve the dropped fingers.

J. B. Murphy (1915) used the flexor carpi radialis alone, putting it into the extensors of the thumb and fingers.

Dr. Speed now describes an operation for permanent relief of wrist and finger drop. He uses the flexor carpi radialis (going to the extensor brevis pollicis and the abductor longus pollicis), the flexor carpi ulnaris (going to the extensor communis digitorum, the extensor indicis and the extensor longus pollicis), and lastly the supinator brevis (inserted into the belly of the extensor communis digitorum).

Excellent pictures are given of the technique, and it is said that an ultimately excellent functional use is the usual result.

J. A. N.

Arteritis Obliterans. BECK, EARL: *Surgical Clinics of Chicago*, December, 1920.

THE author reports the case of a Russian Jew of thirty-eight years, with ulceration and loss of substance in several toes and marked impairment of the circulation. No other evidence of disease is present. Different kinds of treatment had been tried without success.

Dr. Beck cured this case by having him dip his feet into hot and cold water alternately, 15 to 20 minutes in each—neither the high nor the low temperature to be of extreme degree.

J. A. N.

The Orthopædic Treatment of Burns. HARRINGTON, A. H. AND BOORSTEIN, S. W.: *Annals of Surgery*, November, 1920.

ATTENTION is drawn to the well-known contracture deformities following burns, and the preventive measures in use at the Fordham Hospital are described. Particular attention is given to the prevention of deformity in burns of the neck, upper arm, elbow, fingers, etc.

From an extensive experience the authors conclude that contractures resulting from burns can easily be prevented by simple orthopædic measures and posturings adopted from the beginning of treatment; that early recovery is obtained and the fixation of the parts in proper position accelerates healing.

The importance of the subject dealt with in this paper commands the attention of all practitioners.

J. A. N.

Malignant Adenopathy of Bones of Foot, Probably of Thyroid Gland Origin.

BROWN, H. R.: *Jour. Amer. Med. Assoc.*, December 25th, 1920.

This is a case report describing malignant adenomata in a woman's fibula and foot, thought to have been metastases from a thyroid tumor removed five years previously. The nature of the thyroid tumour was unknown.

The Nature of Arthritis and Rheumatoid Conditions. PEMBERTON, RALPH: *Jour. Amer. Med. Assoc.*, December 25th, 1920.

A VERY interesting and instructive article emphasizing the physiologic and metabolic aspects of arthritis. It follows several previous studies on arthritis by the same author who feels that focal infection alone is not sufficient to explain many of the phenomena of this disease. The article does not lend itself to condensation, but its perusal is recommended to all interested in the arthritides.

J. A. N.

Removal of the Astragalus in Paralytic Feet.

—**Results in 217 Cases.** SEVER, JAMES WARREN: *Jour. Amer. Med. Assoc.*, October 30th, 1920.

A CAREFUL analysis of the end results of astragalectomy, with special attention to the Whitman operation. The author feels that while this operation has a definite field of usefulness it is often performed unnecessarily, as for example to relieve ankle instability where but one muscle group is paralyzed, or to cure a limp. It is to be noted that the operation of astragalectomy was originally described by Whitman as a treatment for calcaneo-valgus deformity, since which time it has been used for various other types, of lateral instability at the ankle. The tendency to varus and equinus deformities following the operation is noted.

Dr. Sever concedes that it is as good an operation as any in flail feet, or those with only one muscle group left.

J. A. N.

Tuberculous Arthritis of the Knee Joint: Ankylosis in a Faulty Position; Knee Joint Resection. BECK, CARL: *Surgical Clinics of Chicago*, December, 1920.

PATIENT is a boy of nine years with knee-joint tuberculosis which has been present for three

years and is still active. There is ankylosis at almost right angled flexion.

In the absence of deformity this disease can be cured by conservative measures, x-ray exposures being of service. As it is, an ankylosis in good position is the best result attainable. This is secured by removing bone from both femur and tibia, allowing only slight flexion to remain. x-rays will then be used to destroy what tuberculous foci may remain.

J. A. N.

Bone Cysts. MONTGOMERY, A. H.: *Surgical Clinics of Chicago*.

Two cases are presented, one being a six year old girl who fractured her humerus just below the head, as the result of but slight violence.

An x-ray revealed an egg-shaped area of rarefaction, through which the fracture line extended. With non-operative immobilization, the cyst cavity became filled in solidly by callus formation.

The second case, a woman of twenty nine, showed extensive bone cyst of the upper end of the femur with pathological fracture of the neck, and non-union. The cyst was opened into from the lateral aspect, curetted, and cauterized with phenol followed by alcohol. The cavity had no lining membrane, and was left filled with glycerine and iodoform emulsion.

New bone formation gradually closed in the cyst cavity and a good solid union of the fracture resulted.

A discussion of bone cysts, infections, metaplastic and neoplastic, follows.

J. A. N.

X-rays in the Treatment of Fibromata and Uterine Hæmorrhages. PANNETON, J. E.: *Amer. Jour. of Roentgenology*, November, 1920.

SURGICAL intervention is the treatment of choice in dealing with very large tumours which may give rise to grave pressure symptoms; in tumours of rapid growth, pedunculated tumours, tumours complicated by cystic or inflammatory lesions of the adnexa and in those undergoing a process of malignant degeneration.

Röntgenotherapy is employed most successfully in the following cases:—

1. In small simple fibromata, characterized only by a sensation of weight or fatigue in the lower abdomen, with menorrhagia.

2. In large fibromata palpable through the abdominal wall rising perhaps as high as the umbilicus and accompanied by such symptoms as

the mechanical type of constipation, very difficult to overcome and due to pressure on the iliac colon; frequent micturition due to diminution of the capacity of the bladder by pressure; lumbar and sciatic pain due to pressure on the lumbar and sacral plexuses. The menstrual periods may be normal as to amount and duration, or may be slightly increased in both.

3. In fibromata of any size accompanied by more or less severe hæmorrhage.

4. In uterine hæmorrhages of non-infectious origin and in certain painful menorrhagias without demonstrable fibroids.

5. In uterine hæmorrhages with sub-involution, or in hæmorrhages preceding a delayed menopause.

In all of these cases results obtained are such as to be best represented by the words, "Cure" or "Clinical Cure", provided that the dose administered has been considerably more than that actually necessary to produce the menopause.

Panneton quotes Dr. A. Beclère, of the Hôpital St. Antoine, Paris, in the "Archives d'Electricité Medicale", showing success in 96 to 97 per cent. of the cases. These figures are from selected cases, for in each case it was only after careful study of the therapeutic indications or contra-indications that roentgenotherapy was judged preferable to surgical intervention.

Youth is not a barrier to the production of an artificial menopause provided there is a therapeutic indication for it. Other things being equal the younger the patient the longer the time required to produce it. It is necessary to warn young women that complete sterility may be produced.

Amongst the advantages of roentgenotherapy, the following are enumerated, namely, the elimination of whatever risks there may be from an anæsthetic; the elimination of the possibility of post-operative hernia, hæmorrhage, suppuration or adhesions. The patient is not bed-fast and roentgenotherapy has no mortality percentage.

Panneton's statistics include forty-four cases, the ages varying from thirty-seven to fifty-five years. Forty-one were clinical cures; three were failures; two of the failures were due to diagnostic errors and the cause of the third is imputed to the patient.

If the patient does not experience a marked improvement after the third or fourth series, it is either not a case of fibroma or else adnexal complications are present which require surgical intervention.

Dr. Panneton follows largely the technique

described by Dr. Beclère, that is, radiation of the two ovarian regions anteriorly, directing the rays obliquely through the uterus. In some cases he tried the method of multiple ports of entry, eight anterior and eight posterior, but did not appear to produce the menopause any more rapidly than by the more simple method of Beclère. Dr. Panneton works with a parallel spark gap of twenty to twenty-two cm.; three millimeters of aluminum, and radiant energy equivalent to 16 X. In women more than fifty years of age the menopause was produced by one or two treatments; from forty to fifty years by three or four treatments; from thirty to forty years five to seven treatments. As to fibromata, the number of applications required to make them disappear varied from five to ten series according to their size and age. Some of the very large tumours disappeared completely, apparently they were clinically cured, the signs and symptoms disappearing. One case of a large pedunculated fibroid was unaffected by roentgenotherapy and the treatment was abandoned. In some cases where it was desirable to produce prompt results four ports of entry were used. When two ports of entry only were used, malaise, vertigo and nausea were much less evident than when many ports were employed. In serious cases where immediate action is indicated, doses of thirty or even forty X have been used with excellent result upon the hæmorrhage, but in these cases the general effects have been more marked. The results obtained by Dr. Panneton have been permanent, the earlier cases dating back eight years.

W. A. W.

MEDICINE

Epidemic Hiccough. ACHARD, C. H., AND ROUILLARD, J.: *Bul. et Mém. Soc. Med. des Hopitaux de Paris*, December 23rd, 1920, p. 1534. RICET, M. L.: Same Vol., p. 1541.

THESE authors point out over thirty cases of this condition met within a week. In the discussion which followed their papers, it was shown that about five out of six doctors had had similar cases to treat. The majority of patients were men, often with a history of a light attack of influenza some months previously. The onset was generally sudden with slight fever, headache, and sometimes digestive disturbance. The hiccough itself varied in intensity from a slight one

at fairly long intervals to a severe spasm of the diaphragm occurring five to ten times a minute. More careful examination of this in some patients revealed clonic contractions of this muscle on one side only, as was proved by x-rays, often without the peculiar sound due to closure of the glottis so characteristic of this affection. In addition there was a condition of myo-clonus of the anterior, abdominal muscles, as well as to a lesser degree, of those of the neck. These rhythmic waves of contraction were more pronounced on one side than on the other. In some cases the onset was preceded by brachial or cervical neuralgia for a few days.

These points differentiate it from a hysterical manifestation, and tend to show its relationship, if not its identity with epidemic encephalitis of a toxic nature.

As a rule the affection was of a mild type lasting a few hours to a few days. Compression of the eye-balls seemed particularly efficacious in treatment.

J. L. D. M.

The Diagnosis and Treatment of Some Disorders of the Endocrine Glands. MURRAY, G. R.: *Brit. Med. Jour.*, November 27th, 1920, p. 807.

EARLY diagnosis of endocrine disorders is of great importance. Particularly is this the case in disturbed thyroid function, where early medical treatment may save the long months of invalidism associated with the control of a full blown hyper or hypothyroidism. The author recommends not only a careful history, but also a thorough examination of the diseased gland: inspection and palpation play a dominant rôle in the differential diagnosis of simple thyroid enlargement, of cystic, and of adenomatous goitre. The presence and degree of compression of the trachea may be ascertained by auscultation over the trachea between the cricoid cartilage and the top of the sternum. A flattened trachea gives a high pitched inspiratory and expiratory breath sound. The size of the goitre is no criterion of the presence or absence of tracheal pressure. X-rays may be of use in detecting retrosternal goitre and tracheal displacement.

The degree of functional activity of the gland is to be gauged only by a careful study of the patient. Murray emphasises the importance of symptoms in the stage of onset; the lassitude, loss of weight, change of disposition, fine tremor, and slightly increased pulse rate. Palpitation

and over response to slight exertion and emotion are also in evidence. Careful search usually reveals some one or other of the eye signs, and some thyroid enlargement. In these early cases studies of basal metabolism are a great help in distinguishing a true hyperthyroidism from early tuberculosis or from a cardiac neurosis. They also offer a means of following the effects of treatment.

Medical treatment consists in rest in bed for a few weeks; later twelve to sixteen hours a day usually suffices. A liberal dietary should be prescribed, chiefly of carbohydrate and fat, meat and meat extracts should be avoided, as they seem to stimulate thyroid activity. X-rays exposure at short intervals, or radium at longer intervals will control early cases in three to six months, but one to two years of radiotherapy may be required for the more fully developed types.

Hypothyroid states are also of vital importance in childhood, where early thyroid treatment may remove all trace of glandular deficiency. In children the signs are delayed growth, coldness of the extremities, and slight thickening of the subcutaneous tissues; in adults gradual loss of energy, slowed mentality and loss of memory may suggest a hypothyroidism, as well as the more usual skin changes, etc. Thyroid medication is required permanently in these persons, and the dose may have to be increased as time goes on, due to a progressive atrophy of the gland. (Dose: half to two grains daily for children and three to five grains for adults.)

Pituitary disorders can be diagnosed only by indirect examination. The symptoms fall under two heads, those arising from pressure on the surrounding tissues, the "neighbourhood symptoms" of Cushing, and those due to a disturbed function of the pituitary, the "glandular symptoms". The former include temporo-frontal headache, bitemporal hemianopsia, and oculo-motor paralysis. Excessive activity of the gland results in gigantism in the young, and the well-known acromegaly in the middle aged, while a decreased activity may result in the lack of sexual development at puberty with a large increase in the subcutaneous fat, that is an adiposogenital dystrophy. In the adult the fat has a typical distribution, the supraclavicular fossæ, the backs of the arms, fronts and sides of the abdomen, the hips and the upper thighs are the sites of election, the hands, feet, wrists and ankles being little changed. In these cases the sugar tolerance is markedly increased, while in

hyperactivity of the gland the tolerance is lowered.

The polyuria of diabetes insipidus is also associated with a hypoplasia of the tuber cinereum, and can be controlled by injections of pituitrin (1 c.c. daily) over long periods, but oral administration of the dried gland does not give such gratifying results.

The medulla of the suprarenal glands produces adrenalin, a powerful stimulant to the sympathetic, while the cortex is probably concerned with the development of the sex glands. Destructive lesions of the adrenals, particularly tuberculosis, give rise to the symptoms of Addison's disease. Progressive asthenia, low blood pressure, and pigmentation of the skin and the buccal mucosa, are early signs of adrenal insufficiency. Unfortunately we are unable to control this insufficiency by the use of adrenal tissue in any known form, either by injection or ingestion. Adrenalin has a powerful action on smooth muscle, causing instant relaxation, and this action may be used in the treatment of bronchial asthma and of cesophageal spasm.

D. S. L.

The Contents of the Stomach: Its Study and Interpretation. BEST, E. J.: *Amer. Jour. Med. Sci.*, December, 1920, Vol. 170, p. 889.

BEST believes that the fractional method, carefully interpreted, gives vastly more information than the old "one sample test" of gastric analysis. A "Rehfuß" tube is passed into the fasting stomach in the morning, the patient having taken a few prunes on retiring. Fasting contents should not exceed 100 c.c. The tube is removed and an Ewald meal of bread and water given. After half an hour, the tube is again swallowed and 3 to 5 c.c. contents aspirated, every fifteen minutes for the two hour period, when the residue is aspirated and measured. In titrating the fractions, 1 c.c. of contents, using N-100 NaOH gives standard readings. A curve is then plotted, using the acid figures as ordinates, the time as abscissæ. The actual acid values mean little; note rather the fasting acidity, the apex, and position of curve in two hours and relation of free HCl to total acid. There are five main groups:—

1. The normal, where there is moderate fasting acidity; the apex is reached in one to one and one-half hours (sixty to ninety total)

and moderate decline—free acid following the total, about 20 degrees below. 2. Frequently, a high fasting acidity which drops quickly after the meal and rises steadily to a high value at the end of the two hour period, the free acid often approaching the total. In this group may fall cases of gastric ulcer, duodenal ulcer, gall bladder infections and chronic appendicitis. 3. This type shows a moderate or low total acid with free HCl showing an irregular relationship. Cases of subacute gastritis—or chronic focal infections in the mouth, gall bladder, etc., may fall into this group and the microscopic examination helps the diagnosis. 4. Is a progression of three. HCl is very low and irregular, appearing only in some specimens; cases of chronic gastritis of long standing, and malignancy often fall into this class. 5. Is the achylia group, with a low flat total—about ten—and no free HCl. Ferments are also absent.

The recovery of over 100 c.c. of fluid at the two hour period points to retention, or hypersecretion.

A. T. H.

Alimentary Hypersecretion; Gastric Hypersecretion; Gastrochronorrhæa. CROHN, BURRILL B. AND REISS, JOHN: *Amer. Jour. Med. Sci.*, January, 1921.

THE literature on the subject is reviewed from 1882 when Reichmann described a case in which the fasting stomach contained a large amount of gastric secretion. Fifty cases are studied, from the wards of Mount Sinai Hospital, by means of the fractional test meal, care being taken to exclude cases of pyloric obstruction. The normal amount of fasting contents was taken as about 30 c.c., and in this series the average amount was 65 c.c., but amounts from 90 to 130 c.c. were common. One case secreted 30 c.c. every five minutes whereas 1 to 2 c.c. is the normal amount.

Acidity in the fasting contents, in hypersecretion, is much the same as in cases of normal secretion, the average being, free HCl 30, total acidity 50, that is, slightly lower than during the digestive period.

Three classes were distinguished:

1. Continuous hypersecretion, with a continuous flow of large quantities of secretion during, and after digestion and in the fasting state.

2. Continuous hypersecretion occurring inter-

mittently, associated with some condition, such as migraine, tabes or hysteria.

3. Alimentary hypersecretion, occurring during the digestive and post digestive period, and generally attributed to a pathological condition such as ulcer. It is a common symptom and here the fractional meal is of great value, as the hypersecretion takes place in the late digestive and interdigestive periods, that is after the time when the Ewald meal is removed.

The technique used was, the fasting stomach contents were removed, and then a drink of gruel was given and a little of the contents withdrawn every fifteen minutes by the tube which was left in the stomach. At the end of one and three-quarter or two hours, all the gruel had passed on, and normally the gastric secretion becomes less and less and ceases about this time. If it continues for two or three hours after the last trace of gruel has disappeared, we have a case of alimentary hypersecretion or if it is still more marked and lasts four or five hours we call it a case of continuous hypersecretion or gastro-chronorrhea. As the emptying time, that is the time when the last of the test meal left the stomach did not differ from the normal, every case where fluid could be removed after the two hour period, was regarded as one of hypersecretion.

More than 50 per cent. of the cases studied were secreting strongly at the end of three or four hours, and so must be classified as cases of continuous hypersecretion. The free HCl and total acidity were high, the average being, free 62.9 and the total 84, so that hyperacidity was the rule.

The type of curve of acidity was of interest; a primary digestive curve showing a tendency to return to the base line at the emptying time, followed by a smaller secondary rise to a certain level, which was maintained at that level, usually, till the end of the observations. Diagrams of these curves are shown.

The clinical diagnoses in the cases showing hypersecretion were varied, including duodenal and gastric ulcer, cholelithiasis, chronic appendicitis, migraine, syphilis, etc.

The writers think that 30 per cent. of ulcer cases show hypersecretion and that it may be caused by reflex irritation, from disease in other organs as the appendix and gall bladder. Psychic influences may also cause it, and a case is cited where an emotional disturbance happening in the ward, set it up.

Having carefully reviewed the literature, and from a consideration of the cases studied, the writers do not think that Reichmann's disease exists as a clinical entity.

R. H. M. H.

A New Diet for Gastric Ulcer. COLEMAN, W.: *Proceedings of the Soc. for Exp. Bio. and Med.*, November 17th, 1920, Vol. 18, p. 43.

In the author's opinion the diets usually employed in the medical treatment of gastric ulcer fail in their two most essential points; that is (1) "to protect the ulcer from mechanical and chemical injury, and (2) to maintain the nutrition of the patient at a level which will favour the healing of the ulcer. The diet proposed consists of a preliminary three to five days' rest for the stomach through the use of glucose enemata, 300 c.c. of a 7 to 12 per cent. solution by the Murphy drip method, three or four times a day. Then olive oil is given by mouth, at first in small quantities, increasing gradually up to 150 c.c. a day (gives 1395 calories). After two or three days of oil feeding the whites of two or three eggs a day are added. These are increased to five or six a day (gives 7-8 grams of nitrogen with 450 calories). The 100 grams of glucose given per rectum throughout the treatment increases the total caloric intake to 2,200 per day. This regime is continued for three to four weeks.

The diet is supported by Pawlow's work which has shown that egg-albumen does not call forth gastric secretion, and that oils inhibit it. Coleman has used it for eight years with satisfactory results.

E. H. M.

Prevention of Diabetes Mellitus. JOSLIN, E. P.: *Jour. Amer. Med. Assoc.*, January 8th, 1921, Vol. 76, p. 79.

In a comprehensive article, Joslin brings before the profession the importance of obesity as an aetiological agent in diabetes mellitus. The study of a series of 1,000 consecutive cases, in which the age, weight, and height data were complete, shows a closer relation between obesity and diabetes than previous literature has indicated. Using as a basis, life insurance tables for normal weights, his series shows that persons 21 or more per cent. overweight are seventy-nine times more liable to become diabetic than those of the same degree underweight. Great stress is laid upon the early diagnosis of the

disease, as it is only through a proper control of the incipient cases that its increasing prevalence can be arrested.

E. H. M.

The Rôle of the Electrocardiogram in Prognosis. HEARD, JAMES D. and HEIN, G. E.: *Amer. Jour. Med. Sci.*, Vol. 160, No. 6, December, 1920.

THE authors emphasize the fact that the value of the electrocardiogram as an aid to diagnosis and prognosis, especially in hearts acting regularly at approximately normal rates, has not been fully appreciated by the profession.

Of a total of 780 patients examined, 560 were available for study, under the above limitations.

Various case reports and tracings are presented illustrating distortions of the primary ventricular complex as usually associated with conduction defects below the bifurcation of the main bundle of His, substantiating previous evidence that such tracings are found in patients presenting arborization block. Once established such tracings do not return to normal.

They find that decreased amplitude of the ventricular complexes in all leads, signifies a weak myocardium with a relatively high mortality.

Attention is drawn to the fact, that a prolongation of the P-R. interval and an inversion of T wave in the first lead are of definite prognostic value, only when previous digitalization can be ruled out.

C. F. M.

Amyl Nitrite and Vascular Reactions. RICHARD, GABRIEL: *Archives des Mal. au Cœur*, September, 1920, p. 416.

In one hundred subjects, the author carried out a series of experiments on the blood-pressure, after the inhalation of five minims of this drug for two minutes. The reaction varies with the state of the arterial walls and the sympathetic and vagus systems. In arteriosclerosis, there is a weak vasodilator and hypotension reaction with a slow return to normal tension due to loss of elasticity. In non-sclerotic hypertension, these two symptoms are absent. In so-called sympathicotony (predominance of accelerator nerve symptoms), the subjects shows a marked and rapid increase in rate, with deep fall in systolic and diastolic pressures, and especially a characteristic hypertension after the nitrite effect has passed. In vagotony (subjects with predominance of vagus symptoms) the fall

is less, there is no secondary hypertension, while extra systoles may appear under the influence of the nitrite.

J. L. D. M.

The Influence of Digitalis on the Different Phases of the Heart Beat. HARRIS, I.: *Quarterly Jour. of Med.*, October, 1919, Vol. 13, No. 49.

THE action of digitalis administered by mouth in the form of the tincture was carefully examined by means of the electrocardiograph.

Three distinct phases of its action were discernible. In the first stage marked diminution of the pulse rate is accompanied by prolongation of both ventricular systole and diastole. In the second stage the pulse rate is the same as before the administration of the drug, but systole is shortened and diastole is slightly increased. The third stage is manifested by marked pulse acceleration; the systole is shortened in some cases to more than 50 per cent. that of its length prior to the administration and the diastole becomes even shorter than systole. The passage of the second stage into the third stage is due to increasing intra-cardiac pressure reaching a point at which the musculature is no longer able to bear the strain and dilates with increased pulse rate. In addition to previously described electrocardiographic changes a negative depression is noted in the middle of the ventricular systole due to a rising intra-ventricular pressure and increasing dilation, found only in the second stage. The author warns against the indiscriminate use of digitalis.

Illustrative electrocardiograms and tables are given.

C. F. M.

THERAPEUTICS

The Pharmacology of Chelidonin, a Neglected Alkaloid of Chelidonium or Tetterwort. HANZLIK, P. T.: *Jour. Amer. Med. Assoc.*, Vol. 75, p. 1324, November 13th, 1920.

HANZLIK calls attention to the activity of chelidonin, an alkaloid which resembles papaverin and the benzyl esters in its mode of action, but which differs from morphin in several particulars.

It causes depression and narcosis, but unlike morphin it does not cause any subsequent excitation of the central nervous system. It slows the pulse and lowers blood pressure owing to cardiac depression, and it relaxes smooth muscle

in all regions. Therapeutically it is indicated in hypertonus, angina pectoris, bronchial asthma, and in intestinal, ureteral and uterine colic.

It is more palatable than the benzyl esters. Owing to its relatively low toxicity, he suggests that it might be given to children with comparative safety, and to a certain extent replace morphin in pediatric practice.

D. S. L.

DERMATOLOGY

Alopecia Areata. BARBER, H. W.: *Brit. Jour. of Derm. and Syphilis*, January, 1921.

MENTION is made of some of the theories as to the aetiology of this disease, neuropathic, parasitic, disorders of thyroid, etc., but in the writer's opinion the *fons et origo* lies in focal infection of the teeth and gums, tonsil, naso-pharynx and sinuses. He holds that streptococcus pyogenes-longus is the infective organism usually responsible. He thinks it hardly possible to exaggerate the importance of focal sepsis in dermatology, especially as regards the tonsils, which may easily be overlooked. In his series of cases, alopecia areata was associated with infected tonsils with or without adenoids, in 62 per cent.; and, combined with oral sepsis, in 25 per cent. Cultures from the teeth, gums and tonsils gave a great preponderance of streptococcus pyogenes longus. Comment is made on the severity of alopecia following erysipelas, also the frequent loss of hair in the influenza epidemic of 1918.

In the treatment, it is admitted that even with the removal of septic foci and subsequent vaccination, there are cases in which there is no growth of the hair, but in his opinion, the most important part of the treatment is always the removal of infective foci, where possible. If no such focus can be found, then general tonic treatment and local stimulation is necessary. For general treatment, he recommends iron

and arsenic, where anæmia exists and quotes Sutton as having had good results with urotropine. Local stimulants are, pure carbolic or lysol. Ultra violet rays have been used with good results in some long standing cases. An added note by Mr. Zamora, dwells on the need for most careful examination to exclude infection of the tonsils. He speaks especially of the type of tonsil which, from previous inflammation or incomplete operation, presents a firm scar covering tonsillar remnants, and recalls the consensus of opinion that hypertrophy of the tonsil is no guide to its degree of infection.

H. E. MacD.

The Influence of Trauma on the Distribution of Psoriasis. SMALL, WM., D.D.: *Edin. Med. Jour.*, January, 1921.

REFERENCE is made to the observation that psoriasis frequently follows cutaneous trauma, usually while the disease is active, but sometimes apparently, during the quiescent stage. Two distinct groups of cases were noted during the war. In one group, the disease first showed itself in the region of wounds, but later broke out more or less generally. In the other group, the disease became superimposed on some other cutaneous malady.

Illustrative cases are given of these two types. In one, a soldier, previously quite free from the disease, developed it extensively around a wound on the back, and scattered lesions appeared elsewhere later on. In the other cases, there was an original generalized eruption of scabies and pyoderma, with a small patch of psoriasis on each elbow and knee, of long standing. The scabies cleared up with treatment, but it was noted that the lesions gradually took on the character of psoriasis.

Other diseases noted as determining the distribution of psoriasis are seborrhœa and various forms of impetigo.

H. E. MacD.

News Items

ONTARIO

EXECUTIVE COMMITTEE OF THE ONTARIO MEDICAL ASSOCIATION WAITS UPON THE HON. WALTER ROLLO, MINISTER OF LABOUR AND HEALTH

ON behalf of the Ontario Medical Association, the Executive Committee of that body waited upon the Hon. Walter Rollo, on Friday, January 21st, to discuss several points of interest to the public and the profession. The Minister gave the deputation a very sympathetic hearing, and evinced keen interest in the various problems presented, among which were the following:

WORKMEN'S COMPENSATION ACT

The deputation held that, as very important participators in the working out of the Act, the profession should be represented on the governing body, and that a useful purpose would be served by having a joint conference of the Board with representatives of the Association. The Minister readily consented to arrange the suggested meeting, and stated that changes in the personnel of the Board would likely be announced within the next few weeks.

INSPECTION OF SCHOOL CHILDREN

The Ontario Medical Association humbly submitted that the medical inspection of school children should come under the Department of Health and not under the Department of Education, as at present existing. The Minister informed the Committee that his Department would not be averse to taking over this important work, as the Chief Officer of Health could easily co-relate it with his department.

The Committee stated that they felt that no public health work was of greater importance than the safeguarding of the health of the children, and that a Government which was placing upwards of one-half million dollars in the annual estimates for the Department of Health, would speedily see to it that medical work was supervised and carried out by a medically trained personnel.

LABORATORY FACILITIES

It was held by the medical men that there should be available in every county, a well-equipped laboratory for diagnostic work obviating the necessity of having this work done at distant points, causing delay in diagnosis which might frequently jeopardize the health of the community. The Minister pointed out that the Department was making provision for the establishment of additional laboratories, and that he hoped to see evolved a plan which would make it possible for every county so desiring it to have such laboratory facilities.

IMPORTATION OF SALVARSAN PRODUCTS

The delegation urged that restrictions should be removed from the importation of salvarsan products having due regard to efficiency only of the products available. In this the Minister concurred.

It was also asked that there be an extension of license of the Department of Health to sell the arsephenamine now being manufactured by the Department, to medical men in the province for use in private practice. In this the Minister concurred.

THE ONTARIO TEMPERANCE ACT

The delegation felt that, as the workings of this Act imposed certain obligations upon the medical profession, they should have the privilege of conferring with the Board of License Commissioners to discuss problems which have arisen. The Minister pointed out that, although the Commissioners were not associated with his department, he would be glad to arrange the conference through the Attorney-General and that the request would undoubtedly be granted.

MODERN CLINIC FOR PETERBOROUGH

BELIEVING that co-operation makes for efficiency, six of the leading practitioners of Peterborough many months ago conceived the idea of uniting their resources in the establishment of a group system of practice. The outcome has been the opening of the Standard Medical and Surgical Clinic, a most modern and thoroughly equipped building staffed by Doctors G. Stewart Cameron, Malcolm McCulloch, A. Moir, Frank S. Neal, J. B. Mann and J. H. Eastwood, all of whom have enjoyed successful practices in Peterborough for some years.

No expense has been spared in placing at the disposal of the staff the best and most useful appliances that modern science offers. Special attention has been devoted to x-ray and laboratory facilities, permitting of the most careful and exhaustive diagnostic procedures.

Although each member of the staff is taking over a certain division of the work, which obviously makes for efficiency, the family-doctor idea is not being entirely obliterated, as each will see his own patients at the clinic as has formerly been done at the respective homes, while the services of the whole group are available according to the requirements of the individual case.

The extreme care which has been exercised by the personnel of the clinic in every detail connected with their structure, their plans of operation and co-operation, together with the splendid professional reputation which each one enjoys, bespeaks a very useful and successful future for the undertaking.

LANARK COUNTY ORGANIZES MEDICAL SOCIETY

At an enthusiastic meeting of the practitioners of Lanark County held in Smith's Falls, on Friday, January 28th, it was unanimously decided to organize a County Medical Society to be directly affiliated with the Ontario Medical Association. The visitors to the meeting were Dr. H. A. Boyce, of Kingston, counsellor for the division in the Ontario Medical Association, who spoke on "The need for better Organization of the medical profession", and Dr. T. C. Routley, Secretary of the Ontario Medical Association, who endeavoured to elaborate the points set forth by Dr. Boyce.

The scientific programme was provided by Professor J. A. Austin, of Queen's University,

who gave a very excellent paper on the "Gall Bladder".

In the organization of the society, the officers elected were: President, Dr. W. A. Gray, Smith's Falls; Vice-President, Dr. A. W. Dwyer, Perth; Secretary-Treasurer, Dr. R. M. Ferguson, Smith's Falls. It was agreed by all present that much good work could be done by such an organization in the County of Lanark.

NIAGARA DISTRICT MEDICAL ASSOCIATION

THE Niagara District Medical Association held a very enjoyable and profitable meeting on Wednesday, January 26th, at the Clifton Inn, Niagara Falls. A large number of local practitioners sat down to dinner at 7 p.m., and later listened to a very excellent paper by Dr. J. T. Rice, of Buffalo, on "Thyroid Therapy". Dr. Rice gave the meeting considerable food for thought and discussion in connection with the work which is being done on the thyroid gland. Particularly interesting was the fact that the discussion which followed Dr. Rice's paper was heartily entered into by most of the men present. Dr. Routley, of Toronto, was also invited to the meeting to speak on the subject of "Impending Medical Legislation". Dr. Routley reviewed the present situation of the practice of medicine in Ontario, pointing out the loopholes which allowed irregulars to practice in the province. A very free and frank discussion developed, most of the men present having very sound arguments in favour of suppressing the irregular practitioners.

NORTH WATERLOO MEDICAL SOCIETY

A VERY excellent meeting of the North Waterloo Medical Society was held at the Collegiate Institute, Kitchener, on the evening of Friday, January 14th. An unusual feature of the County Medical meeting was the presence by invitation of a large number of nurses to hear the address of Dr. Norman Gwyn, of Toronto, on "Encephalitis Lethargica". Dr. Gwyn's paper proved to be extremely interesting and instructive to the large and representative gathering which was present. Additional interest was afforded by the presentation of a number of slides illustrating the subject. By unanimous resolution, a hearty

vote of thanks was tendered to Dr. Gwyn for the splendid manner in which he had handled this subject of rather new and consuming interest. The meeting was also addressed by Dr. Routley, the Secretary of the Ontario Medical Association on the subject of better organization.

LAMBTON COUNTY MEDICAL SOCIETY

THE Lambton County Medical Society held their regular quarterly meeting at Wyoming, on Wednesday, February 9th, at 2.30 p.m., with Dr. J. Bell of Sarnia, the President, in the chair, and a very representative group of practitioners in the county present. This being the annual meeting of the society, an election took place. The officers for the ensuing year will be: President, Dr. C. W. Sawers, of Watford; Vice-President, Dr. G. H. R. Hamilton, of Petrolia; Secretary-Treasurer, Dr. C. R. Smith, of Petrolia.

An interesting paper on the "Gall Bladder" was read by Dr. MacDonald, of Sarnia. Dr. Routley,

Secretary of the Ontario Medical Association, outlined some of the work which the Association was undertaking, laying particular emphasis upon the need for better medical legislation. Following the address, the meeting developed into a round table conference, every gentleman present being asked to take part. In this way, exchange of ideas added very much to the interest and profit of the meeting.

SOUTH WATERLOO MEDICAL SOCIETY

THE regular meeting of the South Waterloo Medical Society was held in Galt, on Thursday, February 10th. At the afternoon session Dr. J. A. Oille, of Toronto, conducted the clinic on a number of heart cases. Dinner was served at 6 p.m. The evening session was addressed by Dr. T. C. Routley, of Toronto, on the subject of "Impending Medical Legislation". The attendance was good, and the meeting altogether a successful one.

ALBERTA

At the last meeting of the Alberta Medical Association the President, Dr. F. W. Gershaw, in his address, gave tribute to the memory of the late Dr. J. D. Lafferty as a man of high ideals, a good physician and a good citizen. He entered a plea for the better care of maternity cases and laid emphasis upon the desirability of giving every prospective mother the comfort and safety that modern science provides. He urged a

campaign to spread the knowledge of the contagious nature of tuberculosis, and drew a contrast between the free treatment of venereal disease with the lack of it in tuberculosis.

He urged the necessity of giving every child the right to be well born, intelligently and adequately fed, clothed and sheltered that thus we might avoid the 30 per cent. of disabilities found amongst the young adult population, disqualifying for military service.

Book Reviews

PUBLIC HEALTH AND HYGIENE: In Contributions by Eminent Authorities. By WILLIAM HALLOCK PARK, M.D., professor of bacteriology and hygiene, University of Bellevue Hospital Medical College, etc. 884 pages. Price, \$10.00. Publishers: Lea & Febiger, Philadelphia and New York, 1920.

THIS is one of the latest works on hygiene and public health, and its appearance is welcome. The editor, Dr. W. H. Park, is well-known to the medical profession as a noted authority on many public health subjects. The names of those associated with him are also familiar to many medical readers.

The book contains thirty-one chapters and thus covers a wide range of subjects—the usual ones met with in works of this kind—and some additional ones.

The chapter on the prevention of individual infectious diseases with special reference to influenza is very valuable. It has a full account of the report of the committee of the American Public Health Association on the epidemic of influenza in 1918. Detailed instructions are given with regard to the preventive and administrative measures found most effective at that time.

The growing importance of housing in public health work is deservedly recognized by its inclusion in this book as a special chapter.

The subject of milk in all its sanitary phases is dealt with in a very comprehensive and thoroughly up-to-date manner. Two chapters are given to it and they are among the best in the book. The methods of securing public sanitary control of the milk supply are outlined; the sanitary requirements of dairies are laid down; the diseases transmitted by milk are discussed. The question of pasteurization is fully considered and the reasons for and against are plainly stated. The results of the investigation of milk used for infant feeding are very illuminating and complete and the conclusions arrived at quite convincing. Dr. Park is right in insisting that milk should be supervised "at every stage from the dairy to the breakfast table".

The chapter on water supplies and their purification does not come up to expectations. The treatment of this important subject is altogether too brief. There is no mention either of the distribution of water or domestic purification.

The book contains a very timely chapter on rural public health work. The importance of selecting the proper type of qualified physician as health officer is stressed, and the organization of a rural health department is laid down on a very sound and practical basis. The necessity of making reports, keeping records and conducting sanitary surveys is dwelt upon—and the manner in which this can be done is indicated.

The chapter on sewage is very weak. Nothing is said of the chemical principles upon which sewage disposal is founded, and this extensive subject is covered in a little more than half a dozen pages.

Among some of the excellent chapters are those in industrial, child, mental and personal hygiene and vital statistics.

The book in hand which runs to 884 pages is well printed, the paper is good, and the illustrations are neatly executed. Though not considered a satisfactory text-book for students it is very valuable for reference purposes and can be recommended to physicians and especially to public health officials.

R. ST. J. M.

SCURVY, PAST AND PRESENT. By ALFRED F. HESS, M.D., clinical professor of pædiatrics, University and Bellevue Hospital Medical College, New York City, 279 pages with illustrations. Publishers: J. B. Lippincott Co., Philadelphia, London, and 201 Unity Building, Montreal, 1920.

So many isolated observations have appeared recently on the vitamins and the deficiency diseases, that it is a relief to turn to a good critical review of one of these disorders.

The disease is treated under the usual heads: natural history, ætiology, pathology, clinical picture, etc., but in addition there are excellent chapters on the anti-scorbutic vitamins, the

anti-scorbutic foods, and the treatment of the disease.

Our knowledge of the metabolism of scurvy is still in a very confused state, only two or three cases have been studied by the newer methods, and the results so far obtained suggest that we are not attacking the problem from the correct standpoint. Hess also presents a very good section on the relation of scurvy to the other deficiency diseases; here he allows himself a certain freedom of speculation, but elsewhere there is a notable adherence to facts.

The monograph will find a ready acceptance with those engaged in pædiatric practice, where scurvy is still of relatively frequent occurrence due to the popularity of pasteurized milk and the proprietary foods. D. S. L.

INTERNATIONAL CLINICS. A Quarterly of Illustrated Clinical Lectures and especially prepared original articles on treatment, medicine, surgery, etc. Edited by H. R. M. LANDIS, M.D., Philadelphia, U.S.A., with the collaboration of CHAS. H. MAYO, M.D., and others. Volume iii, thirtieth series, 1920. 297 pages. Publishers: J. B. Lippincott Co., Ltd., Philadelphia and London, 1920.

THE chief interest of the present volume centres in McCrae's clinic on aneurism of the hepatic artery. There are also notes on the syphilitic phlebitides, sterilization of the mental deficient, and a report on six cases of thymic dyspnoea with a short critical review of thymus surgery. Dr. Mary O'Malley presents some of the newer ideas regarding the psychopathology and treatment of certain of the psychoses, in a very interesting thesis.

The section on industrial medicine also contains the usual series of case reports with a critical discussion of each, which will have a very real value to those engaged in industrial practice.

D. S. L.

LE TYPHUS EXANTHEMATIQUE. By Dr. M. JEANNERET-MINKINE, Price 2/9. Published by Librairie Payot & Cie, 106 Boulevard Saint-Germain, 1915.

It is good, occasionally, to read a book in a language other than our own. It is good, occasionally, for practitioners to read of diseases and of conditions that are not familiar to them. For these reasons this little book, written by a young

Swiss physician who served in Serbia during the war, is well worth reading. The French is beautifully lucid. His style is logical and connected. The book holds no dry page from cover to cover. The clinical descriptions have a wit that is the more striking since the symptoms are largely based upon the author's own experience of the disease—he narrowly escaped with his life. His descriptions of conditions during an epidemic; the advice for the management of a civil population, of soldiers, and of hospitals, are vivid and bear the clear imprint of a practised understanding. The importance and deadliness of the disease are impressed by a mention of the millions who have died of it during the past few years, and by the names of six well-known research workers who were lost while studying the disease during the war. It is made very clear that typhus is a disease of misery which, far from being extinct, will continue wherever lack of means, resulting from war or famine, forces men to live crowded together in verminous and unclean surroundings.

J. L. T.

SURGERY, RECONSTRUCTIVE AND ORTHOPÆDIC APPLIANCES, PENSIONS. ("Chirurgie Réparatrice et Orthopédique Appareillage et Invalidités".) Edited by M. M. JEANBRAU, NOVE-JOSSERAUD ET OMBREDANNE and numerous contributors. Masson & Co., Paris.

THIS recent publication is very extensive in its scope. It consists of two volumes comprising 1294 pages and 1036 illustrations in two divisions.

The first division takes up in general the method of repair in wounds of the integument, vessels, nerves, muscles and tendons. The formation and pathology of callus is considered and following that the rôle of the bone graft is extensively discussed. (Cuneo.)

The chapter on amputation is very thorough and the importance of the fitting of artificial limbs is emphasized. Following this is an extensive discussion of "Cinematic Amputations" so strongly advocated by the Italian surgeons. The authors confess that they have not yet adopted this procedure as being of permanent use to the patient. (Nove-Josseraud and Lambret.)

The second division of the work discusses the deformities by regions. The opening chapters on facial defects are contributed by Ombrédanne compiled from the Val de Grâce Clinic; following which head and thorax reconstructive surgery is fully treated. The orthopedic surgery of the extremities is the most extensive section of the

work. The whole work is a valuable contribution written in the characteristic French style. The regional classification is excellent and each subject is well discussed.

W. G. T.

PRACTICAL MASSAGE AND CORRECTIVE EXERCISES WITH APPLIED ANATOMY. By HARTVIG NISSEN, president of Posse Normal School of Gymnastics. Fourth revised edition, 225 pages with 68 original illustrations. Price \$2.00 net. Publishers: F. A. Davis Company, Philadelphia. 1920,

THIS little book will be found useful to students of Massage and Remedial Gymnastics and to medical men interested in these subjects. The greater part of the contents is devoted to a description of the various manipulations and movements used in massage treatment and corrective exercises, and is accompanied by numerous illustrations. The author has made some additions to the previous Edition which was published in 1889. The book, however, does not appear to reflect adequately the great progress that has been made in recent years in Physiotherapy. Massage with remedial exercises, particularly the forms used for functional re-education when employed in connection with Hydrotherapy, Radiant heat baths and various forms of Electrotherapy have produced remarkable results in the treatment of disabled soldiers in convalescent homes and military hospitals. Apparently Mr. Nissen's experience has been mainly from civilian practice, as, in his book he makes no reference to treatment for such conditions as shell shock, disabilities due to peripheral nerve lesions and the after treatment of fractures and joint injuries. It is to be regretted that no book has yet appeared which satisfactorily deals with Physiotherapy in its widest sense.

F. W. H.

ANXIETY HYSTERIA: MODERN VIEWS ON SOME NEUROSES. By C. L. RIXON, M.D., M.R.C.S., senior neurologist, Ministry of Pensions' Neurological Hospital, and D. Matthew, M.C., M.B., Ch.B., with a foreword by Col. Sir A. Lisle Webb, K.B.E., C.B., C.M.G., 124 pages. Price 4/6 net. Publishers H. K. Lewis & Co. Ltd., London, 1920.

MANY books and articles have been written on the war neuroses. These conditions have been discussed from all points of view, both physical and psychological. The present volume, by Drs. Rixon and Matthew, is a small volume,

which discusses one form of these war neuroses, on account of its being the commonest of functional nervous disorders, mainly from the psychological viewpoint. Nearly one-half the book is given to the discussion of the psycho-pathology of the disorder, and, in this chapter, the authors discuss in a most able manner, the cause of anxiety hysteria. This chapter, in itself, is well worth the publication of this volume, and we would recommend this chapter to be read by physicians who have to deal with patients suffering from a functional nervous disorder. An almost too brief chapter is given on the treatment of the disease, and the authors describe in a few pages some of the conversion symptoms of the disorder. Although a small volume, the authors have clearly shown that functional nervous disorders are a psychological problem, and should be treated from that standpoint.

G. S. M.

THE FORM AND FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM. An Introduction to the Study of Nervous Diseases. By FREDERICK TILNEY, M.D., Ph.D., professor of neurology, Columbia University, and HENRY ALSOP RILEY, A.M., M.D., associate in neurology, Columbia University. 1020 pages; 591 figures, containing 763 illustrations, of which 56 are coloured. Price, \$12.00. Publishers: Paul B. Hoeber, New York, 1921.

FOR many years neurologists have been endeavouring to teach diseases of the nervous system from the anatomical and physiological viewpoint.

Purves Stewart, in his excellent book "The Diagnosis of the Nervous System", describes the various symptoms found in nervous diseases from an anatomical standpoint. In this present volume, by Tilney and Riley, the authors have gone further. As they state in their preface: "This work is designed to fill the gap between morphology and the practical requirements of clinical medicine. It aims to visualize the living nervous system; to make accessible an appreciation of its vital relation to the functions which go to make up life, as well as the defects in these relations which result in disease."

They have fully achieved their purpose and have opened up a new interest, as well as vision, in neurology. This book cannot be too highly recommended to all those interested in the nervous system.

G. S. M.

A TEXT-BOOK OF BIOLOGY. For Students in General, Medical and Technical Courses. By WILLIAM MARTIN SMALLWOOD, Ph.D., professor of comparative anatomy in the Liberal Arts College of Syracuse University. Fourth edition. Thoroughly revised. 308 pages, with illustrations. Price \$13.50. Publishers: Lea & Febiger, Philadelphia and New York, 1920.

THIS text-book is admirably adapted for an introduction to biology after the student has had some laboratory practice, wherever the particular course of instruction laid down in it is more or less closely followed. It embraces the principles governing the life of animals and plants in health and disease. The success which the author has achieved in his efforts to cover so much ground in a volume of 300 pages, including more than 200 illustrations, some of them original, is sufficiently attested by the issue of a fourth edition.

It is therefore permissible to point out a few minor blemishes which could be remedied in future editions. The literature references are given in a meagre fashion, often without indication of date and place of publication, and misprints are frequent. All of the lists require to be "thoroughly revised."

The volume opens with a description of the frog as the type of a complex animal, certain features being selected for special treatment. Without apparent rhyme or reason, a figure of the frog's skeleton is sandwiched between photo-gravures of the bull frog and the wood frog. But this breach of continuity is less open to objection than the employment of figures drawn from salamanders as text-illustrations for the frog. Thus the heart figure on p. 43 is that of the hell-bender (*Cryptobranchus*) after A. M. Reese. In this figure the index letters "R.A." obtrude themselves in staring capitals. They are not mentioned in the legend nor in the text. In the original article from which the figure is copied R.A. stands for "right auricle", but as the right and left anterior venæ cavæ open into it the part so labelled should be the sinus venosus as in all Amphibia without exception. The part called "left auricle" in this figure is obviously the entire auricular division of the heart. This example shows the unsuitability of introducing out-of-the-way types in an elementary text-book, nor is the anatomy of the frog so "exceedingly simple" as the author seeks to convey (p. 19). The sympathetic cords do not lie in the coelomic cavity (p. 58) but in the subvertebral lymph space.

As a whole the numerous illustrations are well-chosen and well-executed, and the author deserves praise for presenting this synthesis of biological principles, ranging from frog spawn to snake poison, "as Homer's Iliad in a nut." The many topics dealt with include fertilization, fermentation, parasitism and mendelism, and there is an original figure of twin turtles in one egg on p. 289.

A. W.

PUBLIC HEALTH AND INSURANCE: American Addresses. By SIR ARTHUR NEWSHOLME, K.C.B., M.D., F.R.C.P., lecturer on public health administration at the School of Hygiene and Public Health, Johns Hopkins University, Baltimore. 269 pages. Price, \$2.50. Published by: The Johns Hopkins Press, Baltimore, 1920.

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D. D. M.

REFRACTION AND MOTILITY OF THE EYE, with Chapters on Colour Blindness and the Field of Vision Designed for Students and Practitioners. By ELLICE M. ALGER, M.D., F.A.C.S., professor of ophthalmology at the New York Post-Graduate Medical School. Second revised edition, 394 pages with 125 illustrations. Price, \$2.50. Publishers: F. A. Davis Company, Philadelphia, 1920.

THIS little book has been reprinted a number of times without change since its first appearance, but the recent recrudescence of interest in ophthalmology has made another edition desirable, with some changes and additions. Prepared originally as a series of lectures to the author's post-graduate students, the work includes a number of topics not usually found in books on refraction; but, as the subjects are closely related, their treatment is not without convenience in a manual of this kind. The chapter headings are as follows: Optics; the emmetropic eye; ophthal-

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astigmatism; presbyopia—anisometropia—apha-
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